PULP & PAPER

November 1989

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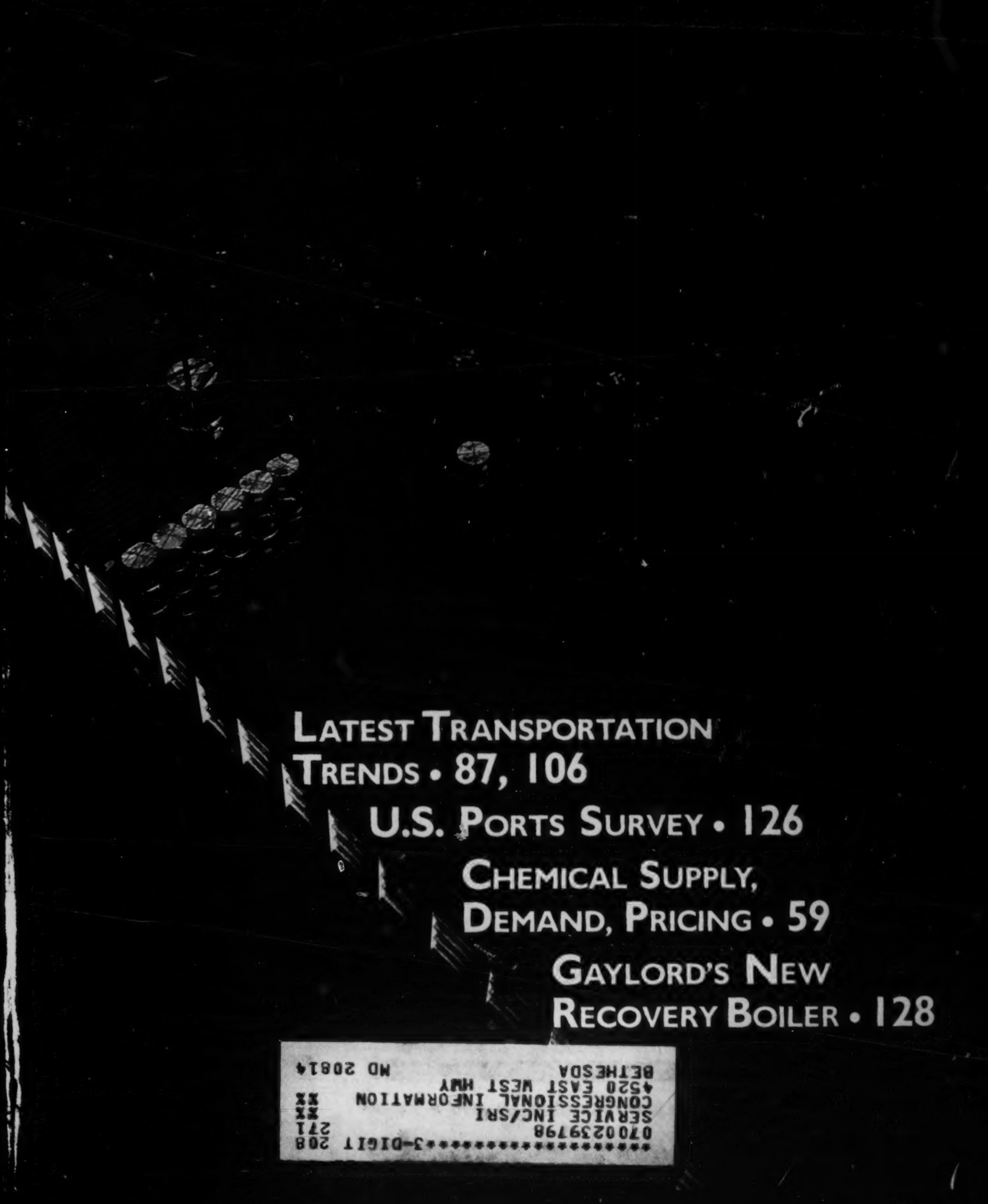

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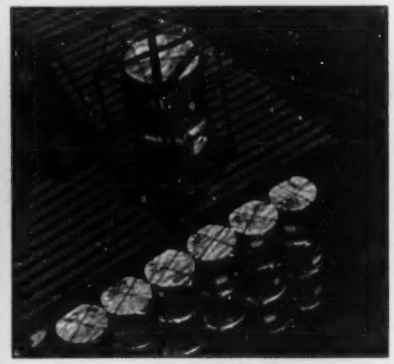

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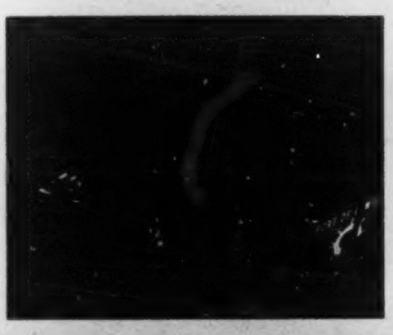

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***Transportation of pulp, paper, and woodchips is becoming a more important operation as companies streamline operations and take advantage of a favorable transportation market. This issue focuses on current transportation trends in the paper industry.* (Photo of barge loading at Potlatch's Lewiston Idaho, mill by Tom Tracy courtesy of Potlatch Corp.)**

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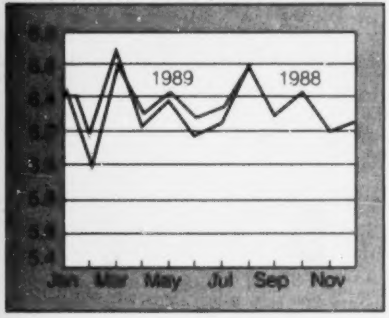
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.6 million tons in August, down 0.2% from the same month last year, according to the American Paper Institute. On a seasonally adjusted basis, the annual production rate through August was 37.94 million tpy for paper, down 1.0% from 1988, and 38.59 million tpy for paperboard, up 0.9%. Inventory drawdowns and sluggish advertising markets have cut into demand for paper this year, according to API, while paperboard has benefited from higher industrial production and more balanced consumer inventories.

Among major grades, printing and writing paper shipments through August were down 1.9% from 1988, thanks to declining shipments of coated paper and uncoated free-sheet. Uncoated groundwood was the one bright spot, rising 8.7% through August. Containerboard production for domestic use was up 1.3%, fueled by a 1.8% rise in fiber box shipments.

Canadian newsprint shipments remained in the doldrums, falling 4.3% to 811,000 metric tons in August. Woodpulp shipments rose 5.8% in August to 693,000 tons but still lagged 3.2% behind for the year to date. Operating rates dipped to 95% at newsprint mills and 96% at pulp mills for the month. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Aug.	510	0.2	5,996	0.5
Uncoated groundwood (s)	Aug.	151	2.7	1,752	8.7
Coated paper (s)	Aug.	652	0.6	7,081	-4.7
Uncoated free-sheet (s)	Aug.	950	-3.3	11,096	-1.8
Other printing/writing	Aug.	134	-0.7	1,537	2.2
Total packaging and other paper (s)	Aug.	426	-1.4	4,881	-3.1
Tissue	Aug.	473	0.4	5,590	2.2
Total paper	**Aug.**	**3,296**	**-0.8**	**37,935**	**-1.1**
Unbleached kraft paperboard	Aug.	1,700	2.0	19,696	1.3
Semichemical medium	Aug.	488	-1.2	5,719	1.4
Bleached paperboard	Aug.	389	-1.5	4,576	0.8
Recycled paperboard	Aug.	724	-0.8	8,673	-2.2
Total paperboard	**Aug.**	**3,300**	**0.5**	**38,666**	**0.8**
Total U.S. paper and paperboard output	**Aug.**	**6,596**	**-0.2**	**76,600**	**-0.1**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	July	5,395	3.4	62,350	2.3
Market pulp production	July	764	4.9	8,875	4.7
Wastepaper consumption at paper/board mills	July	1,578	3.5	18,930	0.7
Pulpwood consumption (cords)	July	8,548	8.2	98,421	3.3
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	Aug.	27.709	2.3	209.533[6]	1.8
Containerboard inventories at U.S. box plants and mills	Aug. 1	2,689	-1.3		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	July	916	-12.6	12,626	-1.5
Imports of Canadian newsprint	July	586	-17.2	7,850[6]	-8.3
U.S. paper exports (including products)	July	486	12.8	6,237	12.6
Exports of unbleached kraft linerboard	July	164	-2.4	2,222	3.7
Exports of woodpulp	July	540	37.8	6,372	19.9
Norscan pulp inventories[4]	Aug. 31	1,028	21.7		
Norscan pulp operating rates[4]	Aug.	101%	96%	97%	98%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Aug.	811	-4.3	6,350[6]	-2.5
Operating rates	Aug.	95%	100%	96%	99%
Inventories held by U.S. consumers	Aug. 31	1,344	-16.8		
Other paper/board shipments	Aug.	605	5.8	4,462	-0.2
Woodpulp shipments (export only)	Aug.	693	1.8	5,228	-3.2
Operating rates	Aug.	96%	98%	94%	96%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Kraft paper: Weakness in multiwall grades, but grocery sack downturn bottoms out

Grade Structure: Bag and sack paper is the largest category of kraft packaging papers, accounting for about 60% of total shipments in 1988, followed by multiwall, 29%; converting, 8%; and wrapping, 3%. Basis weights for bag and sack paper range from 30 lb to 80 lb/3,000 ft². Multiwall shipping sack paper is 50 lb or 60 lb. Kraft paper's natural color is brown, but a semi- or fully bleached sulfate process will produce kraft paper in lighter shades of brown, cream, or white.

Production/capacity: Unbleached kraft paper (UKP) shipments declined only 1.4% to 2.8 million tons in 1988 after dropping an average 6.5% each year since 1984. Grocery bag and sack shipments dropped 4.8%, but multiwall paper shipments jumped 7.1%. Although total shipments of kraft paper declined, operating rates remained high because most of the swing machines in the industry produced a substantial amount of linerboard, thus eliminating any excess capacity. Total bleached kraft paper (BKP) shipments increased 14% last year to 465,000 tons.

The shipment figures for 1988 have been revised from previously published figures as a result of an industry survey of market distribution of these papers. This year, the American Paper Institute reclassified 237,000 tons of UKP shipments and 67,000 tons of BKP shipments to the specialty packaging and industrial grades. Additionally, 275,000 tons of UKP capacity and 75,000 tons of BKP capacity were reclassified to the 1989 specialty grades.

For the first seven months of 1989, UKP shipments were down 5.1% from the year before. Grocery bag and sack shipments were off only 1.8%, but multiwall paper was down 9.8% due to slowed demand for shipping sacks this year. Despite this slump, mill operating rates have been close to 97% most of the year because a large amount of swing capacity continues to be dedicated to linerboard production. The industry's actual 1989 UKP capacity is estimated at about 2.7 million tons.

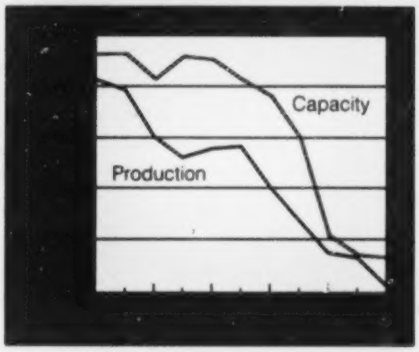
Shipments of bleached kraft paper grades increased only 1.5% in the first seven months of 1989. This modest growth rate reflects a shortage of capacity to produce these grades and not a drop in demand. Every producer of BKP grades is sold out. The capacity shortage was further increased in August when Champion International shut down a machine producing 110,000 tons of lightweight bleached cup stock for conversion to uncoated free-sheet production.

No new kraft paper capacity will be added until Longview Fibre Co. completes construction of a new 300-tpd paper machine at its Longview, Wash., mill. The new machine will produce both bleached and unbleached lightweight packaging grades when completed in mid-1990. Last year, Gaylord Container Corp. increased kraft paper capacity from 300 tpd to 450 tpd at its Pine Bluff, Ark., mill, and this year, it acquired two grocery bag and sack plants. Gilman Paper Co. also increased kraft paper capacity last year at its St. Marys, Ga., mill, but the company has converted most of its production from commodity kraft grades to bleached and semibleached converting grades.

Market segments: After a decade-long decline, grocery bag and sack paper shipments may have finally bottomed out. Grocery and retail bag shipments are down slightly in 1989 due mainly to slower consumer spending; inroads by plastic sacks have abated. Multiwall paper shipments in 1989 and 1990 will continue trailing the 1988 level.

Pricing: Producers increased BK and UBK prices approximately $40/ton in first-quarter 1989. Prices are not expected to rise again until early 1990. Heavyweight (70-lb) grocery sack paper prices are currently between $495 and $505/ton; multiwall (50-lb) grades are between $550 and $560/ton; lightweight (30-lb) unbleached grades are $640 to $665/ton; and lightweight bleached grades are $800 to $810/ton.

Year-end price history for 70-lb grocery sack paper: 1980, $280; 1981, $300; 1982, $240; 1983, $280; 1984, $330; 1985, $300; 1986, $365; 1987, $400; 1988, $455/$465. Multiwall sack paper (50 lb): 1980, $375; 1981, $405; 1982, $360; 1983, $390; 1984, $410; 1985, $360; 1986, $400; 1987, $460; 1988, $510/$520. ■



	1987	1988	1989e
Shipments¹	2,839	2,800	2,651
Capacity¹	3,032	2,872	2,869
Utilization rate	93.6	97.5	92.4
Imports	168	162	232
Exports	89	110	117
Apparent U.S. consumption	2,918	2,852	2,766
lb/capita	24.0	23.3	22.3
GNP ratio²	0.76	0.73	0.69

e — Estimate.
1. API revised data series.
2. 1,000 tons/billion $ real GNP.

	Annual capacity¹	Market share (%)
1. Stone Container	773	26.9
2. Georgia-Pacific	355	12.4
3. Union Camp	350	12.2
4. Longview Fibre	285	9.9
5. Gaylord Container	270	9.4
6. International Paper	260	9.1
7. Champion	195	6.8
8. Chesapeake	115	4.0
9. Port Townsend	100	3.5
10. Willamette	70	2.5

Market share of top five companies:
70.8%

Market share of top ten companies:
96.7%

Total U.S. capacity (1989):
2.869 million short tons

1. Unbleached kraft paper capacity only. Some revisions of company capacity figures based on API revised data series.

NEW TECHNOLOGY, ECONOMIC BENEFITS GIVE BOOST TO SECONDARY FIBER USE

While the U.S. lags behind other countries, environmental concerns and legislation are helping increase both wastepaper recovery and use

By LAWRENCE A. BROEREN

The use of secondary fiber for pulp and paper products can lower costs significantly, preserve forest reserves, and assist in reducing the mounting solid waste problem. With an increasing emphasis on recovering wastepaper, secondary fiber use is growing rapidly, and both fiber recovery and use are expected to continue increasing.

Recovery rate is the amount of wastepaper recovered for reuse compared with paper consumed. Utilization rate is the amount of secondary fiber (recovered fiber) used compared with total fiber used. The two rates will differ depending on the amount of imports and exports of paper and wastepaper and inventory changes.

WASTEPAPER RECOVERY. In the U.S., the recovery rate of wastepaper for recycling is about 27%. Japan and Taiwan have recovery rates approaching 50%, and Europe currently has a recovery rate of about 30%, with Germany at about 35% and Holland between 45% and 50%. The practical recovery rate limit may be about 50%. In terms of imports and exports, the U.S. imports a very small amount of wastepaper, while more than 20% of the wastepaper collected is exported. Several major factors affect the recovery of wastepaper:

Standard of living. Higher standards of living are correlated with increased use of cultural paper, such as newspapers, magazines, and books, and with commercial-industrial activities generating office paper, reports, and computer printouts.

Population concentration. The collection of wastepaper from both commercial-industrial generators and households is easier and more economical with a high population concentration.

Alternate fiber uses. The major alternate fiber use is fuel. Using fiber as fuel can be discretionary or legislated. Fiber used as fuel, however, obviously is not available for papermaking.

Social conscience. Some wastepaper is recovered as a matter of social conscience. Recycling wastepaper reduces the number of trees harvested and helps preserve forest reserves.

Price of wastepaper. Larger volumes of wastepaper are recovered from commercial-industrial operations and households when wastepaper prices are high. There is also a minimum price below which the recovery of wastepaper falls drastically.

Price of competitive fiber. Wastepaper prices are influenced by the price of market pulp. One wastepaper classification—pulp substitutes—tracks market pulp prices.

Legislation. Some communities have laws requiring households to separate recyclable waste products (paper, glass, metal) from other refuse for separate collection and recycling.

The sum total of all the factors affecting the recovery of wastepaper indicates that total recovery and the recovery rate will both continue to increase.

SECONDARY FIBER UTILIZATION. Secondary fiber utilization in the U.S. is about 25%. In Japan, it is about 50%. Europe has a rate of about 48%, with Germany at about 45% and Holland at almost 70%. Five major factors affect secondary fiber utilization:

Quality. Historically, low-quality products were made from secondary fiber. Currently, high- and low-quality products are, or can be, made from secondary fiber.

Technology. Contaminant removal technology, including equipment, chemicals, and process control, has been improving rapidly. The technology must link the wastepaper to the finished product.

Contaminants. New contaminants are continuously developing. New contaminants not only increase the concentration of contaminants and change the combination of contaminants but also require improved contaminant removal technology.

Economics. The primary business reason for using secondary fiber is reduced costs. Reduction can be in both operating and capital costs.

Legislation. Legislation requires the use of secondary fiber in some products. The use of postconsumer waste secondary fiber also has been legislated.

Mr. Broeren is corporate consultant, Simons-Eastern Consultants Inc., Decatur, Ga.

WASTEPAPER GRADES, CATEGORIES. Wastepaper is graded according to Circular PS-83, "Paper Stock Standards and Practices," published by the Paper Stock Institute of America, a division of the National Assn. of Recycling Industries Inc. PS-83 also defines conditions of sale. There are 49 standard wastepaper grades, with nine grade numbers not currently in use and 32 specialty grade numbers.

Wastepaper is commonly grouped into five categories:

- Deinking
- Mixed paper
- Pulp substitutes
- Newspaper
- Corrugated.

The 1988 use for each category is shown in Table 1. Figure 1 shows the growth in use for each category from 1986 and projected to 1991. Secondary fiber use as a percent of total fiber is shown in Table 2. The use of secondary fiber in each of the eight U.S. regions is shown in Figure 2, along with the percent of total fiber. Wastepaper categories have been associated with specific processes and finished products (Table 3).

TABLE 1: **Of the five major categories, wastepaper use in 1988 was highest for corrugated, with 49% usage.**

Category	Usage (× 1,000 tons)	%
Deinking	1,716	9
Mixed paper	2,180	11
Pulp substitutes	2,901	15
Newspaper	3,227	16
Corrugated	9,747	49
Total	19,779	100

Source: API

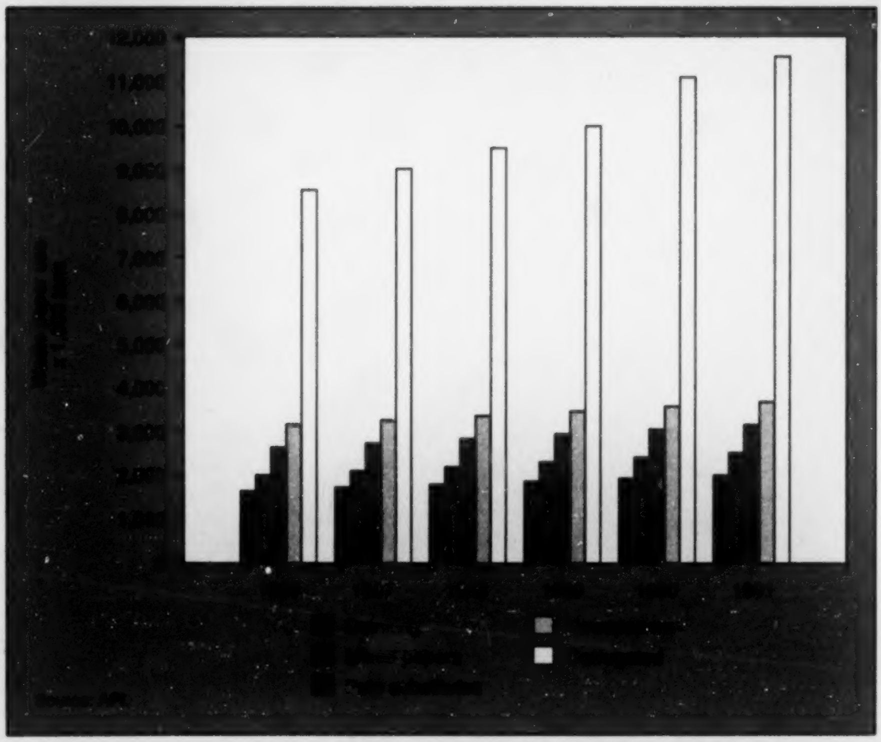
CONTAMINANTS. Contaminants include everything that must be removed from wastepaper to make the fibers usable. Common contaminants include ink, staples, paper clips, rocks, sand, chemicals, and stickies. Stickies include all rubber-like substances that retain their tackiness.

The amount of some contaminants, such as ink, determine the wastepaper grade. For example, hard, white shavings (Grade 30) must be free of printing, and sorted white ledger (Grade 40) must be free of heavily printed stock.

TABLE 2: **As a percentage of total fiber, secondary fiber is expected to increase slowly and possibly even dip slightly in 1991.**

	1986	1987	1988	1989	1990	1991
Secondary fiber (%)	24.5	24.4	24.7	25.2	25.9	25.6

Source: API



Source: API

FIGURE 1: **Wastepaper use is expected to continue increasing, with the most use remaining in the corrugated grade.**

Any material that renders wastepaper unusable as the grade specified is classified as a prohibited material and is not permitted in most grades. A small amount (less than 2%) of prohibited material is permitted in a few "low" grades of wastepaper.

Out-throws are materials unsuitable for the wastepaper grade. Out-throws include permitted prohibited materials. Allowable out-throws range from 0% to 10%, with most grades limiting out-throws to 1% or 2%.

A specific material may be classified as an outthrow in one wastepaper grade and a prohibited material in another. Carbon paper is a prohibited material in sorted white ledger (Grade 40), which does not permit prohibited materials. The same carbon paper is an out-throw in mixed paper (Grade 1), which allows up to 10% out-throws.

Within the limits of the grading system, the type and amount of contaminants can vary significantly. During wastepaper and fiber shortages, the tendency is to reduce wastepaper quality in a grade and to increase the wastepaper grade.

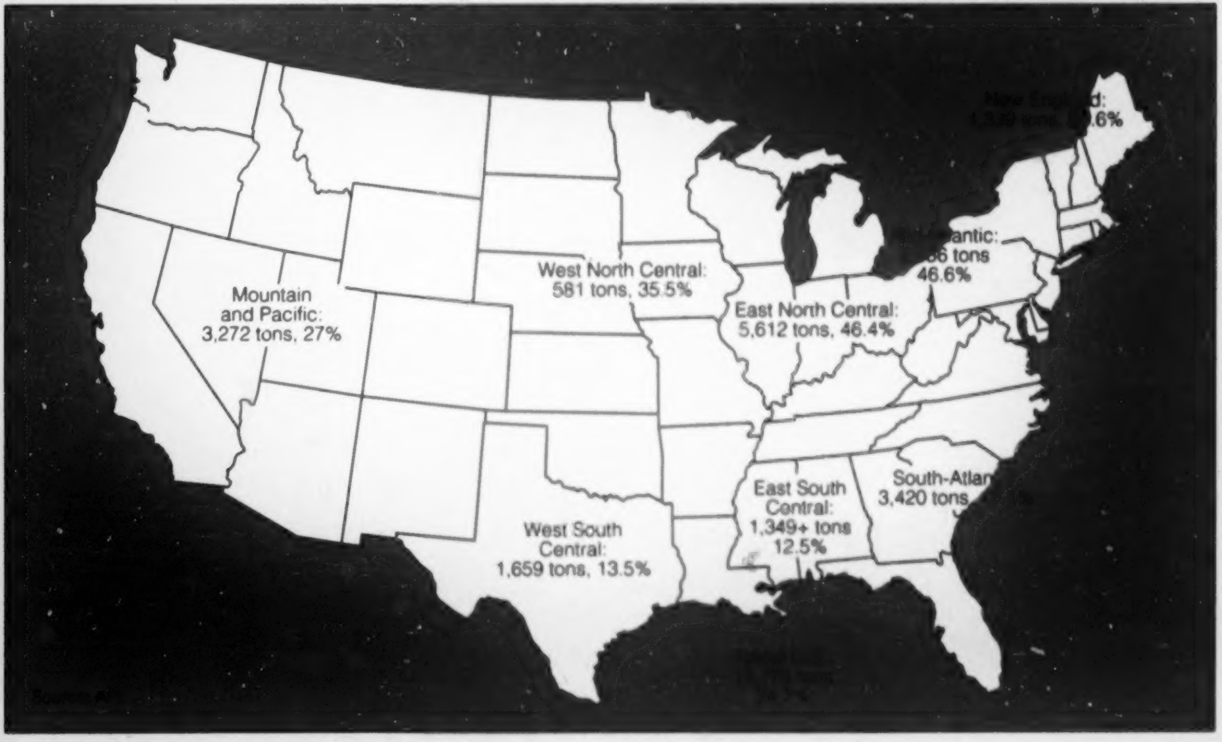
New contaminants are constantly being developed. For example, *National Geographic* recently had a holographic cover and insert. Those holographs will be included in some wastepaper for recycling.

Some contaminants, such as nonimpact inks, are significantly increasing in volume. Nonimpact inks are difficult to remove, especially with a washing deinking system. When the volume of nonimpact inks was small, the nonimpact ink dirt count was also small. Now that the volume of nonimpact inks is increasing, the dirt count is also increasing. Steps are being taken to deal

TABLE 3: **Wastepaper categories are associated with specific processes and finished products.**

Wastepaper category	Process	Finished products
Pulp substitute	Pulping	Fine paper Tissue
Deinking	Pulping Screening Cleaning Deinking	Tissue Fine paper
Newspaper	Pulping Screening Cleaning Deinking	Newsprint Printing papers
Mixed papers	Pulping Screening Cleaning	Roofing Packaging Molded products
Corrugated	Pulping Screening Cleaning Asphalt dispersion	Corrugating medium Linerboard Kraft towels

FIGURE 2: **Of the eight major U.S. regions, secondary-fiber use in 1988 was highest in the east north central and mid-Atlantic regions.**

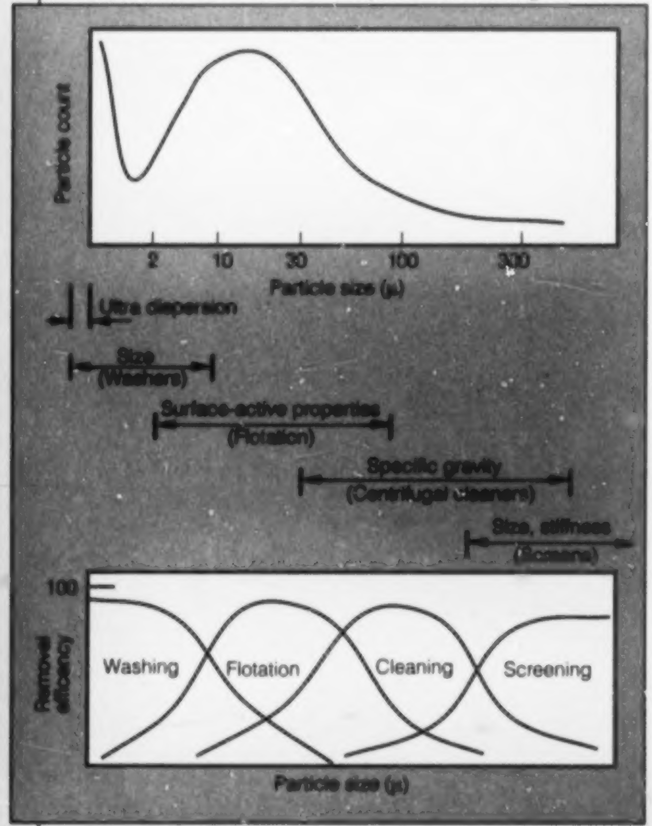


1,339 tons
.6%
antic:
6 tons
46.6%
Mountain and Pacific: 3,272 tons, 27%
West North Central: 581 tons, 35.5%
East North Central: 5,612 tons, 46.4%
East South Central: 1,349+ tons 12.5%
South-Atlan
3,420 tons
West South Central: 1,659 tons, 13.5%
Source: AF

with the increasing amounts of nonimpact inks. The white ledger grade now has a higher-priced subgrade with minimum nonimpact inks. New processing techniques are being developed and used to remove non-impact inks.

Coordination and cooperation between all wastepaper participants—buyer, user, broker, packer, sorter, and seller—are essential. With significant differences in finished product specifications, wastepaper grades and contaminants, process, and the variability in wastepaper grades and contaminants, matching wastepaper to an existing process and finished process specifications is an ongoing, time-consuming task.

FIGURE 3: **Particle-size removal by flotation deinking.**



PROCESSING. As mentioned, the process must link the wastepaper to the finished product. The process must be able to remove enough contaminants so that the secondary fiber can be used to make the finished product within specifications. The major process steps for each of the five secondary fiber categories are shown in Table 4.

Pulp substitutes should require only pulping. To provide paper machine protection, the slushed fiber is usually screened and cleaned, often with the paper machine screens and cleaners. Pulp substitute systems often are stretched by adding small amounts of lightly contaminated wastepaper. Removing these small amounts of contaminants may require using screens, cleaners, and washers.

Corrugated systems require pulping, screening, and cleaning, often in multiple stages. Traditionally, asphalt dispersion systems have been used to disperse contaminants, resulting in a "clean" finished product. New corrugated systems do not include asphalt dispersion.

In the past, processing newspaper for newsprint has been done with a multistage washing deinking process. Current newspaper processing technology uses flotation as the primary ink removal technique. Washing is also used, and dispersion after processing is being evaluated. Dispersion breaks up most of the particles remaining after processing. The dispersed particles are below visual size and, thus, are not visual dirt. These finely dispersed particles can be left in, washed out, or agglomerated and floated out.

Although the major process steps are similar, newsprint deinking is usually considered unique and separate from deinking other wastepaper. This is due to the specific processing requirements for removing oily newsprint ink. In addition, the high percentage of mechanical pulp and the low brightness make this deinked fiber uniquely suited for newsprint and little else.

TABLE 4: **Major process steps for each of the five secondary fiber categories.**

Process	Pulping	Screening	Cleaning	Asphalt dispersion	Washing	Deinking flotation	Dispersion
Wastepaper category							
Pulp substitutes	1						
Mixed paper	1	1	1				
Corrugated	1	1	1	2			
Newspaper	1	1	1		1	3	4
Deinking	1	1	1		1	3	4

1 = Always.
2 = Many in use.
3 = Most new facilities.
4 = Future.

In the past, the U.S. has used the washing process for removing ink, while Europe has used the flotation process. New deinking facilities usually use flotation with washing. Many washing systems are being retrofitted for flotation, and dispersion is also being considered and tried. Flotation deinking particle-size removal is shown in Figure 3.

In washing deinking systems, wastepaper is pulped longer and at a higher pH to end up with more small particles (less than ten microns) and fewer medium-size particles (ten to 25 microns). Washing will remove a high percentage of small particles but only a low percentage of medium-size particles.

Water reuse and clarification is an integral part of deinking. It is especially important in washing deinking systems where there is a return loop from the pulper to the washer to the clarifier and back to the pulper. This loop saves heat, chemicals, and water. The clarifier removes contaminants, specifically ink and clay, so that they are not recycled back into the pulper. Some amount of wastewater must be discharged from the system. This wastewater can be treated by conventional wastewater treatment methods.

The deinking fiber yield ranges from 65% to 85%. The shrinkage, or loss, is from 15% to 35%. The loss from a 200-tpd deinking facility can be from 30 to 70 tpd. This solid waste loss must be dealt with in an environmentally approved manner. The major portion of this solid waste can be burned, spread, or landfilled. A small portion must go to landfill.

EQUIPMENT FOR FLOTATION DEINKING. Major pieces of equipment in a flotation deinking system with washing include the following:

- Pulper: a high-consistency (15%) batch pulper with a separate dump screening system
- High-density cleaner: a high-density (3%) cleaner with automatic dump
- Coarse screens: a system including several stages. The coarse screen baskets can have holes with diameters as small as 0.040 in. Feedforward screening also should be considered.
- Fine screens: a system consisting of several stages. The fine-screen baskets can have slots with diameters as small as 0.006 in. Feedforward screening should be considered as an option.
- Washers: a system that might include sidedhill screens, screw extractors, gravity deckers, or new high-speed (3,000 fpm) washers
- Flotation cells: flotation done in multiple (up to eight) cells in series. A second stage of flotation may be used for fiber recovery.
- Forward cleaner system
- Reverse cleaners: follow the forward cleaners. The flowthrough reverse cleaners have high reverse cleaning efficiency and low reject rates. A mechanical reverse cleaner is being used in Europe.
- Disperger: a recent development, the disperger is similar to a refiner but without cutting plates. The stock feeding the disperger is hot (195°F) and at a high consistency (30%). The hot, thick stock is worked mechanically by the disperger, which breaks up many of the remaining contaminants, including both ink particles and stickies. After dispersion, the ink particles are below visual size.
- Water clarifier: because of a high level of water use, contaminants must be removed so that they are not reinjected into the stock. A dissolved air flotation (DAF) clarifier is used to remove contaminants from the water. A filter can be used ahead of the clarifier to reduce stock losses.
- Solid waste thickener: because most solid waste is removed from the system at a low consistency, it must be dewatered to the appropriate consistency for final disposition. The consistency could be 20% to 30% for landfill and more than 50% for incineration. The solid waste is typically thickened by a belt press for landfill and a screw press for incineration. The filtrate is recycled back to the process.

CHEMICAL PROCESS. In wastepaper deinking, especially flotation deinking, the chemistry is of paramount importance. Pulper chemicals include the following:

- Caustic for defibering
- Sodium silicate for a stabilizer
- Deinking chemicals:
  1. Dispersants for washing
  2. Collectors for flotation
  3. Displectors for washing and flotation
- Calcium chloride for water conditioning
- Hydrogen peroxide for bleaching and preventing yellowing of groundwood.

Process chemicals include defoamers and acid for pH adjustments. Water clarification and sludge thickening require individual polymers. Bleaching can range from none to minimal to extensive. Examples of minimal bleaching would include peroxide added to the pulper or hydrosulfite introduced at the end of the deinking process.

Extensive bleaching would be done in a multistage bleach plant. Typically, this would be CH or CEH. Because of the generation of dioxin in chlorine bleaching,

TABLE 5: **Capital cost range comparison for two wood-based facilities and two wastepaper facilities.**

Facility	Size (tpd)	Cost (X $1,000)
Wood-based facility		
Bleached kraft pulp	600 to 1,200	$600 to $450
Bleached CTMP	300 to 600	$400 to $330
Wastepaper facility		
Deink	200	$175 to $125
Pulp substitutes	200	$100 to $60

new bleaching sequences using chlorine dioxide, oxygen, and other chemicals are in the process of being developed. Black ink cannot be bleached, so it must be removed.

Unit disposal costs at approved public landfills are high . . . Approved private landfills have proven to be not only expensive to construct but also costly to operate.

QUALITY CONTROL. Major factors affecting secondary fiber quality are the wastepaper and the capability of the process. Most processing equipment will remove a percentage of certain contaminants. Altogether, most contaminants will be removed, but some will still remain. Some contaminants will be removed in the papermaking process. The contaminants remaining in the paper must be within finished product specifications. Processed fiber specifications typically include the following:

- Brightness
- Dirt count
- Stickies count
- Ash
- Groundwood content.

Samples are taken from each pulper and visually inspected prior to discharging stock from the pulper. If the pulper sample is not satisfactory, steps, such as adding additional chemicals and extending pulping time, may be taken. If the pulper stock is not satisfactory for processing with these additional steps, then it is put in the bad-batch chest and blended with other upgraded stock.

Other possible actions are reprocessing off-quality stock through the system or increasing contaminant reject rates. Some process samples are taken at selected process locations to verify operating conditions. Bleach plant chemical addition rates are varied so that brightness can be controlled.

ECONOMICS. The capital cost ranges for an economy-of-scale (cost-effective) bleached wastepaper processing facility are lower than those for an economy-of-scale bleached wood-based fiber facility. Table 5 shows capital cost ranges.

An economy-of-scale wastepaper facility is smaller than an economy-of-scale wood-based facility. A wastepaper facility may be uniquely sized for a production level that is not appropriate for an economy-of-scale wood-based facility.

Bleached kraft pulp manufacturing costs vary widely. The deinking manufacturing cost range is within the bleached kraft pulp range. The pulp substitute manufacturing cost range is higher than the deink range. Fiber manufacturing cost ranges (given in dollars/ton) are as follows:

- Bleached kraft pulp: $236 to $445
- Bleached chemi-thermomechanical pulp: $225 to $275
- Deink: $325 to $375
- Pulp substitutes: $425 to $475.

One of the elements in deink manufacturing cost, solid waste disposal, is currently in transition. Traditionally, deink solid waste disposal has been in public or private landfills at a low unit cost in the order of $10/ton. However, only a few landfills are approved. Unapproved landfills must shut down. Unit disposal costs at approved public landfills are high, at approximately $50/ton. Approved private landfills have proven to be not only expensive to construct but also costly to operate.

A typical 200-tpd deinking facility for tissue products would cost about $30 million. This cost includes wastepaper storage, flotation deinking with internal water clarification, and solid waste sludge thickening. In addition, mill services, such as steam and electric power, would necessarily be required to service the deinking facility.

The deinked fiber manufacturing cost would be about $350/ton. This is near the average manufacturing cost for bleached kraft pulp but with one-quarter of the capital cost. A nonintegrated tissue manufacturer not using deinked fiber would be using market pulp or pulp substitutes. Market pulp is currently selling at $700/ton and pulp substitutes at $450/ton.

Using deinked fiber instead of market pulp at a usage level of 200 tpd would result in savings of $350/ton or $70,000/day. This $24.5-million annual savings, with a 40% tax rate, would have a simple payout of two years on a $30-million deinking facility.

Using deinked fiber instead of pulp substitutes would result in $100/ton savings, or $20,000/day. The $7-million annual savings would result in a seven-year payout. Some pulp substitute equipment and buildings could be used in deinking, which would reduce the capital cost and the payout.

There are five major factors for success in secondary fiber:

- Commit to secondary fiber, even though it is different from virgin pulp
- Research the process and equipment
- Develop operating techniques that will optimize performance
- Investigate the causes of low-quality pulp and make the required changes
- Make sure the facility is appropriate to process the selected wastepaper into the quality of stock required to meet the finished product specifications. ■

ISSUE FOCUS: **SHIPPING**

U.S. PORTS PUT MAJOR EMPHASIS ON PURSUING PULP AND PAPER SHIPMENTS

Survey of five ports indicates that major expansions and developments will assist paper companies with imports, exports

By KELLY H. FERGUSON, Projects Editor

As pulp and paper companies begin marketing their products beyond U.S. borders and as the "global marketplace" becomes a reality, inexpensive and efficient shipping becomes a necessity. U.S. ports will play an especially important role in shaping the market for U.S. companies.

To give an overview of current operation and future expansions, *Pulp & Paper* chose five U.S. ports in areas where the paper industry is especially strong—one in the Northwest, two on the East Coast, one on the Gulf of Mexico, and one in the Midwest. This is not intended to be an all-inclusive survey but is only a profile of some of the dominant ports.

ALABAMA STATE DOCKS.

Location: Mobile, Ala.
Number of shipping lines: 125
Number of trucking lines: 65
Major thoroughfares: Interstate 65, Interstate 10
Major waterways: Tennessee-Tombigbee Waterway
Major rail lines: Illinois Central, CSX, Burlington Northern, Norfolk Southern, Mid-South Rail

Shipping volume (based on 1988 tonnage figures):

- Total shipped out: 11,179,965
- Total shipped in: 5,563,558
- Tons shipped out of:
  a. Kraft linerboard—170,395
  b. Newsprint—4,649
  c. Other paper—3,300
  d. Market pulp—526,700
  e. Woodchips—222,801
- Tons shipped in of:
  a. Hardboard—6,070
  b. Newsprint—2,632
  c. Other paper—1,020
  d. Market pulp—147,405

Facilities: 3.2 million ft^2 of covered warehouse space and 1.5 million ft^2 of open storage space. Maintains state-of-the-art pulp and paper handling equipment and RO/RO facilities next to forest products warehouses.

Expansions/developments: plans for expansion are under way to increase forest products warehousing facilities by approximately 350,000 ft^2. Through reconditioning of current warehouse facilities and additional new structures, the port will have a 362,000-ft^2 forest products berth and handling facility.

ASD recently purchased a site that is being reconditioned to offer 153,000 ft^2 of warehouse space and a 500-ft dock. This land includes 88,000 ft^2 of open storage.

In 1988, ASD completed reconditioning of a 173,000-ft^2 forest products terminal. By enhancing the capacity and handling facilities for forest products and maintaining regular service to all parts of the world, ASD offers pulp and paper companies an efficient and economical means to import and export their products.

Comments: Alabama State Docks continually pursues pulp and paper business. By working with rail and trucking lines to acquire the best service available at the best price and with steamship companies, freight forwarders, and stevedores to keep handling costs to a minimum and by keeping the most up-to-date facilities and equipment available, ASD is dedicated to these customers and giving them top service.

PORT OF SEATTLE.

Location: Elliot Bay on Puget Sound, Seattle, Wash.
Number of shipping lines: 30+
Number of trucking lines: 100+
Major thoroughfares: Interstate 5, Interstate 90
Major waterways: Puget Sound, Alaska, Transpacific
Major rail lines: Burlington Northern, Union Pacific

Shipping volume (based on 1988 tonnage figures):

- Total shipped out: 7,679,068
- Total shipped in: 4,162,031
- Tons shipped out of:
  a. Wrapping/kraft paper—294,715
  b. Newsprint—154,365
  c. Paper/paperboard—57,151
  d. Other paper—48,943
  e. Market pulp—421,178
- Tons shipped in of:
  a. Newsprint—240,785
  b. Cigarette paper—15,024

c. Drawing/blueprint paper—7,202
d. Other paper—13,435
e. Market pulp—966

Comments: the Port of Seattle is primarily a container port. It was the leading U.S. port for exports of paper products in 1988 and one of the leading U.S. ports for export of woodpulp in 1988.

PORT OF GREEN BAY.

Location: Green Bay, Wis.
Number of shipping lines: 10
Major thoroughfares: Interstate 43, State Highway 41, State Highway 29
Major waterways: Great Lakes, St. Lawrence Seaway
Major rail lines: Fox River Valley Railroad, Wisconsin Central, Escanaba & Lake Superior, Chicago & Northwestern, Green Bay & Western

Shipping volume (based on 1988 tonnage figures):

- Total shipped out: 46,478
- Total shipped in: 1,655,522
- Tons shipped in of:

a. Market pulp—111,103

Facilities: woodpulp handled at Leicht Material Handling Dock, with three berths and 500,000 ft^2.

Expansions/developments: improving bulk handling facilities.

Comments: working with numerous paper companies to import paper machinery for their expansion.

GEORGIA PORTS AUTHORITY.

Location: Savannah, Ga.
Number of shipping lines: 50+
Number of trucking lines: 100+
Major thoroughfares: Interstate 16/Interstate 75, Interstate 95
Major waterways: South Atlantic
Major rail lines: CSX, Norfolk Southern

Shipping volume (based on 1987 tonnage figures):

- Total shipped out: 4,045,601
- Total shipped in: 6,153,512
- Tons shipped out of:

a. Kraft paper—346,386
b. Paper/paperboard—81,071
c. Hardwood—26,874
d. Market pulp—420,993

- Tons shipped in of:

a. Newsprint—23,165
b. Paper/paperboard—20,272

Expansions/developments: Georgia Ports Authority is planning for TIM-21 (Total Intermodal for the Twenty-First Century), which will provide ships with a land-based total transportation infrastructure. Updating of the Authorities COBRA computer system is ongoing. During 1988, a program was added that enables customs brokers to file paperless entries via a COBRA computer link to the U.S. Food & Drug Administration.

Ongoing enhancements to the COBRA system include a complete break-bulk export system, which will provide cargo receipts by all modes of transportation along with complete inventory control, warehousing functions, and automatic billing.

Savannah's Ocean Terminal is installing its first container crane. The 40-ton-capacity container crane will access eight berths at the Ocean Terminal. Also, construction has begun on the first phase of a sixth container berth, which will add 42 acres of container parking and 1,600 linear ft of berthing to the GPA Containerport.

PORT AUTHORITY OF NEW YORK AND NEW JERSEY.

Location: marine terminals located in Newark, N.J.; Elizabeth, N.J.; Brooklyn, N.Y.; and Staten Island, N.Y.
Number of shipping lines: approximately 100
Number of trucking lines: 10,000+
Major thoroughfares: Interstate 80, Interstate 95, Interstate 78, Interstate 278, Interstate 87
Major waterways: Kill Van Kull, East River, Hudson River
Major rail lines: Conrail

Shipping volume (based on 1988 tonnage figures—long tons):

- Total shipped out: 3,024,132 (general cargo)
- Total shipped in: 9,059,358 (general cargo)
- Tons shipped out of:

a. Paper and paperboard—70,902
b. Newsprint—12,463
c. Market pulp—5,189
d. Wastepaper—938,269
e. Woodchips—1,529

- Tons shipped in of:

a. Paper and paperboard—131,189
b. Newsprint—90,010
c. Market pulp—159,659
d. Wastepaper—6,029
e. Woodchips—2,018

Facilities: Maher Terminal in Port Newark, N.J., currently handles almost all forest products entering the Port of New York and New Jersey. The terminal uses more than 400,000 ft^2 of warehouse space for this type of storage in addition to unloading/loading this cargo efficiently with state-of-the-art pneumatic clamp truck equipment.

Expansions/developments: a $9.6-million rehabilitation program at Port Newark/Elizabeth is under way to upgrade warehouses that currently house forest products (in addition to the rehabilitation of other buildings), which will produce higher-quality storage areas to better accommodate this cargo.

Comments: the port authority is actively pursuing more business from the pulp and paper companies by collaborating with local transportation companies and terminal operators at the port in an effort to respond to the needs of both shippers and consignees. The primary objective is to put together competitive transportation packages that will maintain and attract additional business for the port. ■

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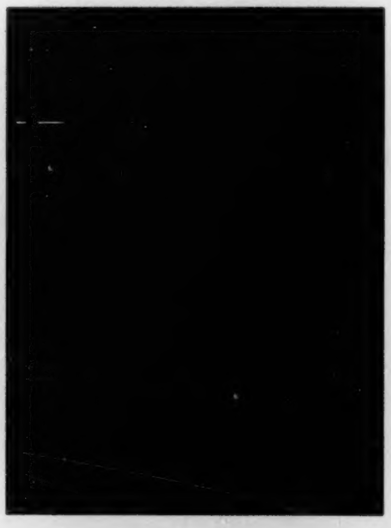

THE COVER

This issue's dual focus on maintenance and training takes a close look at mill efforts to improve overall manpower efficiency. **(Photo of journeyman electrician Melvin Kirschling and apprentice Mary Burns by Dick Durrance courtesy of Consolidated Papers Inc., Wisconsin Rapids, Wis.)**

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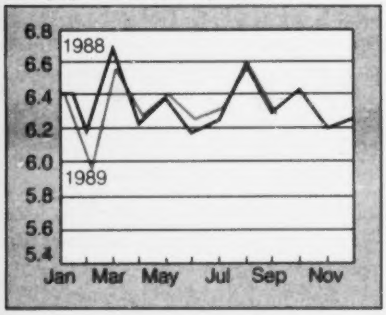
ABP

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.28 million tons in September, down 1.1% from a year earlier, according to American Paper Institute data. The dropoff was mostly due to maintenance and repair downtime taken during September at paperboard mills, API reported. After seasonal adjustments, paper production through the third quarter was down 1.0% from last year, to an annual rate of 37.9 million tpy. The rate of paperboard production was 38.5 million tpy, up 0.7% from 1988.

Among major grades, printing and writing paper was down 2.0% through September, led by declines of 2.4% in uncoated free-sheet and 4.1% in coated paper. The trend rate for coated paper rebounded sharply in the third quarter, however, and lower consumer inventories could lead to better demand for uncoated free-sheet in the months ahead. Containerboard production for domestic use was up 1.2% compared with 1988, while boxboard production for the U.S. rose 0.8%.

Canadian newsprint shipments totaled 830,000 metric tons in September, the same as a year earlier. Woodpulp exports declined 4.8% to 637,000 tons. Operating rates dipped to 93% at newsprint mills and 87% at pulp mills. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
***PAPER & PAPERBOARD PRODUCTION*[1]**					
Newsprint	Sept.	517	5.1	6,019	1.0
Uncoated groundwood (s)	Sept.	152	7.8	1,761	8.5
Coated paper (s)	Sept.	611	0.8	7,109	-4.1
Uncoated free-sheet (s)	Sept.	885	-7.5	11,042	-2.4
Other printing/writing	Sept.	127	1.6	1,528	1.1
Total packaging and other paper (s)	Sept.	408	-7.3	4,882	-3.3
Tissue	Sept.	473	3.3	5,618	2.6
Total paper	**Sept.**	**3,172**	**-1.5**	**37,958**	**-1.0**
Unbleached kraft paperboard	Sept.	1,596	0.4	19,636	1.2
Semichemical medium	Sept.	461	-2.3	5,700	1.2
Bleached paperboard	Sept.	351	-1.1	4,544	0.5
Recycled paperboard	Sept.	695	-2.3	8,638	-2.2
Total paperboard	**Sept.**	**3,103**	**-0.8**	**38,519**	**0.7**
Total U.S. paper and paperboard output	**Sept.**	**6,275**	**-1.1**	**76,477**	**-0.2**
***PULP, WASTEPAPER & FIBER*[2]**					
Total U.S. woodpulp production	Aug.	5,303	0.7	62,518	2.1
Market pulp production	Aug.	757	0.3	8,896	3.8
Wastepaper consumption at paper/board mills	Aug.	1,649	1.4	19,039	0.8
Pulpwood consumption (cords)	Aug.	8,498	6.9	98,865	3.7
***CONVERTED PRODUCTS STATISTICS*[3]**					
Corrugated box shipments (billion ft^2)	Sept.	25.354	-3.1	234.895[6]	1.2
Containerboard inventories at U.S. box plants and mills	Sept. 1	2,664	-2.5		
***INTERNATIONAL TRADE*[2]**					
U.S. paper imports (including products)	Aug.	1,210	11.7	12,864	0.2
Imports of Canadian newsprint	Aug.	767	9.1	8,020[6]	-6.2
U.S. paper exports (including products)	Aug.	560	20.4	6,297	13.6
Exports of unbleached kraft linerboard	Aug.	201	11.7	2,245	4.6
Exports of woodpulp	Aug.	534	7.4	6,375	18.2
Norscan pulp inventories[4]	Sept. 30	994	29.6		
Norscan pulp operating rates[4]	Sept.	93%	101%	96%	98%
CANADIAN STATISTICS*[5] *(reported in metric tons)					
Total newsprint shipments	Sept.	830	0.0	7,180[6]	-2.3
Operating rates	Sept.	93%	96%	95%	99%
Inventories held by U.S. consumers	Sept. 30	1,303	-19.9		
Other paper/board shipments	Sept.	570	6.3	5,031	0.4
Woodpulp shipments (export only)	Sept.	637	-4.8	5,865	-3.4
Operating rates	Sept.	87%	88%	93%	96%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Newsprint: Price erosion eases in last quarter but further capacity in 1990 will add pressure

Grade structure: Newsprint is commonly sold in the U.S. in 28-lb to 32-lb. Although the industry has slowly been drawn to the lighter basis weights, this has been somewhat stalled by increased emphasis on printing quality and a sluggish acceptance of flexographic printing. Standard newsprint is still considered to be 30-lb, with brightness in the 55 to 61 range. Of total newsprint consumed in the U.S. in 1988, 74.7% was used by daily newspapers and the rest was sold to customers including weeklies, commercial printers, shopping news, and government publications, according to the American Newspaper Publishers Assn.

Production/capacity: Newsprint output in 1989 suffered from a two-pronged attack. U.S. consumption was hurt by poor advertising lineage, while total North American supply grew with the addition of five newsprint machines in one year and the expectation of another seven starting up over the next two years.

U.S. mill shipments through the first nine months of 1989 were up 1.3% from the previous year, according to the Canadian Pulp & Paper Assn. Canadian shipments through the first three quarters were down 2.3%. At the same time, U.S. consumption dropped a slight 0.4%.

Canadian mills supplied 55.8% of U.S. newsprint requirements in the first nine months of 1969, down from the 58.6% supply ratio of a year earlier, according to CPPA. Through the third quarter, U.S. overseas shipments were up a robust 47.6% to 388,000 metric tons, while Canadian exports were up 13.4% to 1.283 million tons.

U.S. imports from areas other than Canada plunged 38.1% through the first nine months of 1989 compared with 1988 and represented 2.6% of total imports in that period. At the same time, U.S. domestic sources of supply met 40.8% of demand, a slight increase from a year earlier.

In 1988, Canadian newsprint capacity was 10.325 million metric tons, with the U.S. at 5.687 million tons. U.S. mills produce most of North America's approximately 2.2 million tons of recycled newsprint, while only one newsprint mill in Canada uses wastepaper as a raw material, though a second Canadian mill will start up in 1990.

Outlook: Industry forecasts indicate newsprint consumption should be slightly higher in 1990, following two relatively flat years. Inventory buildup in 1988 has taken much of 1989 to work down, reaching levels lower than in several years. Consumers saw no need to maintain high stocks, as the supply of newsprint should remain plentiful through 1991. At the same time, publishers continued to conserve to keep costs down during these lean times for newspaper advertising lineage. However, Canadian labor negotiations in spring 1990 will probably spark some inventory rebuilding.

North American newsprint capacity will rise by about 2.4 million metric tons during 1989-91, with 12 new machines starting up during that time. Of these, three machines will produce recycled newsprint.

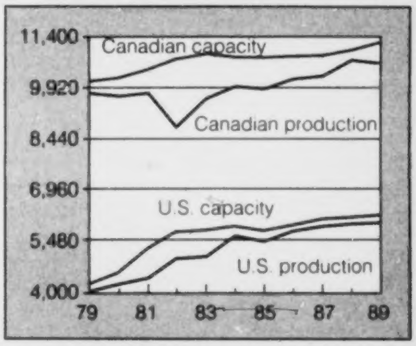
In total, about 370,000 tpy of Canadian capacity was idled permanently or indefinitely during 1989, while the downtime in the U.S. was minor. More downtime, conversions, and closures are expected in 1990 as conditions become more competitive.

Pricing: List prices remained unchanged in 1989. However, almost nonstop erosion occurred in transaction levels. A $30/metric ton price hike slated to go through in the U.S. East on Feb. 1 was rolled back and eventually abandoned. No announced price increases are slated for 1990; instead, there are likely to be further drops in actual prices.

Transaction levels began the year at modest discounts of 5% to 6% but by year-end had risen to 20% and higher for the largest chain buyers. U.S. East list price was $650/metric ton; West was $630/metric ton minus a 5% "full-contract allowance."

List price history is as follows (U.S. East, contract, year-end, per metric ton): 1974, $259; 1975, $284; 1976, $314; 1977, $331; 1978, $353; 1979, $413; 1980, $441; 1981, $500; 1982, $468; 1983, $500; 1984, $535; 1985, $535; 1986, $500; 1987, $570; 1988, $650; 1989, $650.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1987	1988	1989e
Production[1]	5,842	5,982	5,998
Capacity[1]	6,006	6,116	6,269
Utilization rate	97.3	97.8	95.7
Apparent U.S. consumption	14,547	14,357	14,098
lb/capita	119.5	116.8	113.6
GNP ratio	3.41	3.24	3.12
Canada			
Production[2]	10,658	10,989	10,809
Capacity[2]	10,940	11,117	11,381
Utilization rate	97.4	98.8	95.0

e = Pulp & Paper estimate.
1. American Paper Institute.
2. Canadian Pulp & Paper Assn.

TOP U.S. PRODUCERS (000 tpy)

Company	Annual capacity U.S.	Canada	Total	Market share (%)
1. Abitibi-Price	385	1797	2181	12.4%
2. Canadian Pacific[1]	22	1687	1709	9.7%
3. Bowater[2]	1039	247	1286	7.3%
4. Fletcher[3]	—	1232	1232	7.0%
5. Stone-Consolidated	N	1050	1050	6.0%
6. Kruger	N	871	871	4.9%
7. Champion	858	N	858	4.9%
8. Quebec & Ontario	N	839	839	4.8%
9. Boise Cascade	577	250	827	4.7%
10. Kimberly-Clark[4]	419	378	797	4.5%

Market share of top five companies:
42.3%
Market share of top ten companies:
66.0%
Total North American capacity (1989):
17.65 million tons

1. Created by merger of CIP Inc. (100% owned) and Great Lakes Forest Products Ltd. (54.3% owned) in 1988. Includes estimated 1989 output from Gold River Newsprint Limited Partnership and Pondersa Paper Co. (50% owned) mills. 2. Includes Catawba Newsprint Co. (51.0% owned) and Bowater Mersey Paper Co. Ltd. (51.0% owned). 3. Combined operations of Crown Forest Industries (100% owned) and British Columbia Forest Products Ltd. (69% owned) in 1988. Includes startup of new machine at Mackenzie, B.C., in March 1989. 4. Includes Spruce Falls Power & Paper Co Ltd. (50.5% owned).

SALES AND EARNINGS

U.S. paper companies report flat profits in third quarter

U.S. paper industry profits continued to lose steam in the third quarter, reflecting softer demand and prices for many grades, according to a *Pulp & Paper* survey of about 30 companies. Earnings rose 0.3% from year-earlier levels, compared with a 22% increase in the first quarter and a 9.3% increase in the second quarter. Sales rose 10.1% to $24.0 billion. Last year's third quarter was the most profitable quarter in 1988, making it tough this quarter for companies to show a year-to-year improvement with today's softer markets.

The weaker performance reflects discounting in the printing paper sector, continued pressure on newsprint prices compounded by new capacity coming onstream, a failed linerboard price hike, and high wood costs for mills operating in the Pacific Northwest. Pulp producers and bleached board producers fared well in the quarter, although there were some signs of discounting on pulp toward the end of the period. Companies with building products operations in the Northwest benefited from higher lumber and woodchip prices.

Georgia-Pacific Corp. enjoyed the largest increase in profits (56.1%) on sales of $2.6 billion. The excellent showing was attributed to record operating profits in the building products area of $162 million vs $120 million in the 1988 quarter. Pulp and paper profits rose to $236 million vs $150 million a year ago. "Prices are higher than in the year-ago quarter, and our capacity increased, primarily due to the Brunswick acquisition and the startup of the second Port Hudson, La., paper machine," chairman and CEO T. Marshall Hahn Jr. explained. He said demand weakened during the summer, especially in the printing paper and containerboard markets. "Performance in the consumer tissue market as well as market pulp continues to be encouraging," he noted.

Weyerhaeuser Co.'s earnings rose 15% on sales of $2.6 billion. The company said it expects to see the impact of these divestitures on fourth-quarter earnings. Weakening paper prices, the reduced volume of log exports, and the strong dollar are having a negative impact on Weyco's business.

Publication papers weaken. Newsprint producers seem to be struggling. Bowater Inc.'s earnings fell 11.4%. The company said that while newsprint consumption for both the quarter and the year to date was almost unchanged from 1988 levels, increased price discounting from the fear of overcapacity and the costs of starting up two new pulp mills combined to reduce newsprint operating income in the quarter by 48% to $16.2 million. Jefferson Smurfit Corp. said that income from its two newsprint mills in Oregon declined 41% over the first nine months, primarily due to discounting.

Printing paper prices also weakened as customers worked down inventories and the market tried to absorb new capacity. Producers are hopeful that the fourth quarter will be better. Boise Cascade Corp.'s earnings fell 12.7%. The company said demand for uncoated white paper, coated grades, and newsprint slowed simultaneously with new capacity for these grades coming onstream. Mead Corp.'s profits plunged 59% in the quarter. The company said that it was having a good year but that divestitures (including the sale of a 50% share in Brunswick Pulp) and an acquisition of a publishing company make any year-to-year comparisons "difficult."

Consolidated Papers Inc.'s profits rose 5.9%. The company said that the market for coated printing paper strengthened during the third quarter.

U.S. paper industry results.

	Third quarter ($000)			
Companies	**Sales**	**Change 1989/88**	**Earnings[1]**	**Change 1989/88**
Boise Cascade Corp.	$1,100,000	10.0%	$62,800	−12.7%
Bowater Inc.	360,067	3.4	35,458	−11.4
Champion International	1,318,488	2.6	102,062	−16.6
Chesapeake Corp.	205,702	9.2	12,448	−12.9
Consolidated Papers Inc.	228,724	3.1	36,519	5.9
Federal Paper Board Co.	265,337	16.0	49,099	41.5
Georgia-Pacific Corp.	2,646,000	9.8	178,000	56.1
P.H. Glatfelter	143,747	−1.3	21,973	11.5
Great Northern Nekoosa	980,500	4.6	65,700	−7.2
International Paper Co.	2,900,000	20.6	214,000	6.5
James River Corp. (7/30)	1,470,478	6.0	57,250	1.8
Jefferson-Smurfit Corp.	331,065	7.3	31,105	−16.2
Kimberly-Clark	1,452,700	6.2	108,800	20.2
Longview Fibre Co. (7/31)	177,849	4.5	18,097	−35.0
Louisiana-Pacic Corp.	510,100	10.2	51,500	39.9
Mead Corp.	1,197,500	2.0	69,700[2]	−59.1
Mosinee Paper Corp.	57,505	−2.1	2,910	−5.9
Pentair Inc.	300,082	47.2	7,957	−21.3
Pope & Talbot Inc.	162,076	19.8	13,224[2]	56.0
Potlatch Corp.	318,385	16.3	35,133	24.2
Scott Paper Co.	1,249,300	8.6	75,900	−1.3
Sonoco Products Co.	402,527	−1.6	25,767	10.1
Stone Container Corp.	1,373,300	34.3	70,400[2]	−20.9
Temple-Inland	479,900	5.6	55,600	4.9
Union Camp Corp.	667,320	−0.4	76,046	1.3
Wausau Paper Mills Co. (8/31)	83,031	14.3	4,372	5.8
Westvaco Corp. (7/31)	573,131	7.3	55,507	7.1
Weyerhaeuser Paper Co.	2,574,407	5.1	166,836[2]	15.2
Willamette Paper Co.	486,556	10.3	52,883	35.7
Total	**$24,045,757**	**10.1%**	**$1,777,845**	**0.3%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years where possible.
2. **Mead:** 1989 quarter includes a gain of $16.5 million from sale of Mead Release Products. 1988 quarter includes a gain of $100.9 million on sale of stake in Brunswick Pulp. **Pope & Talbot:** 1989 quarter includes a gain of $3.55 million from sale of sawmill. **Stone:** 1989 quarter includes a net gain of $5 million. **Weyerhaeuser:** 1989 quarter includes a $3.6-million pretax loss associated with the initial phase of the company's refocusing plan offset by a $48.99-million gain on sale of common stock by a subsidiary.

Tissue demand strong. Scott Paper Co. said earnings from its U.S. tissue business rose 20% and set a new record despite higher pulp costs. The S.D. Warren division was hurt by weakness in uncoated grades, but demand continues to be strong for its lightweight coated paper made in Skowhegan, Maine.

James River Corp.'s profits inched upward 1.8% on sales of $1.5 billion. This was partially due to the towel and tissue division, which experienced good market demand and pricing gains. Its communication paper business showed a decrease in earnings related to rising woodchip costs and excess industry capacity.

Earnings for Pope & Talbot Inc. jumped 56% to set a new record for the quarter. The company said its Consumer Products Div. had its best results in over two years. The company expects to have a record year in 1989.

Mediocre results in linerboard. Union Camp Corp.'s earnings were up 1.3% on flat sales of 0.4%. The company said that discounting in uncoated business paper hurt earnings. It also suffered some disruption at its kraft paper and liner mill in Savannah, Ga., and its fine paper mill in Eastover, S.C., because of Hurricane Hugo, although neither mill suffered serious damage.

Temple-Inland Inc.'s profits rose 4.9%. It said that although box shipments were up slightly, prices for boxes stayed the same while costs increased. The company expects 1989 to be its third consecutive record year of earnings.

Willamette Industries Inc.'s earnings jumped 35.7%, partly due to record prices for lumber and plywood. The company said that although prices for containerboard are showing weakness, demand is good for corrugated containers and grocery bags.

Longview Fibre Co. said its woodchip costs are about 50% higher than a year ago. Its box plants are having to pay higher prices for containerboard, reducing year-to-date operating profits of this business by 50%.

Bleached board boon. This grade is one of the bright spots in the market. Federal Paper Board Co. Inc. enjoyed a 41.5% increase in earnings. The company said that completion of Phase I of a capital spending program yielded significantly higher earnings at its Augusta, Ga., bleached board mill. ■

Canadian earnings slide 37%; newsprint weakens

Canadian pulp and paper companies saw a continued decline in profits in the third quarter. Earnings fell 37.4% from the same period a year ago while sales increased 1.1% to C$5.6 million. This followed a 19.1% decrease in earnings in the second quarter and a 14.1% decline in the first quarter. The usual suspects were responsible: a stronger Canadian dollar, weak newsprint markets, and higher wood costs in British Columbia. The Canadian dollar was valued at US$0.84 during the first nine months vs $0.81 for the year-earlier period.

Abitibi-Price Inc.'s earnings fell 69% in the quarter to C$13.6 million. The company said sales volume of its newsprint group was down 8% from last year. "Even though cost increases were contained below inflation levels, the combination of exchange rates and a severe erosion of transaction prices resulted in a significant decline in operating profits," the company noted. Bernd K. Koken, chairman and CEO, said he does not expect any short-term strengthening in the newsprint market as more capacity comes onstream and demand remains flat for the second consecutive year. Markets for groundwood paper also softened. The coated paper division experienced a small loss in the quarter as a result of very weak markets in Canada, increasing competition from offshore, and a major capital project.

MacMillan Bloedel Ltd.'s earnings fell 7.2% to $818 million because of weakening newsprint markets and rising costs in British Columbia, but it said demand for pulp and lumber remains strong.

Canadian-Pacific Forest Products Ltd.'s earnings fell 51% in the period. The problem with newsprint was compounded by weaker markets in paperboard, packaging products, and white paper.

Domtar Inc.'s earnings fell 67%. Domtar said operating profits for its pulp and paper business declined to $26 million from $39 million in third-quarter 1988 because improved results for the "rehabilitated Windsor, Que., mill were more than offset by lower market pulp shipments and lower selling prices for newsprint and groundwood specialties."

Canfor Corp.'s earnings rose 18.2% to $26.6 million. Chairman and CEO Peter J.G. Bentley said, "Demand and prices for northern softwood kraft pulp remained strong during the quarter despite indications of some softening for other types of pulp."

Repap Inc.'s earnings fell 16% on increased sales of $331.8 million. Repap said the exchange rate problem alone reduced net income by $4 million in the quarter. ■

Canadian paper industry results.

	Third-quarter earnings (C$000)			
Companies	**Sales**	**Change 1989/88**	**Earnings[1]**	**Change 1989/88**
Abitibi-Price Inc.	$816,400	0.4%	$13,600	−69.4%
Canadian Pacific	707,600	−7.7	45,100	−51.3
Canfor Corp.	254,400	−5.4	26,600[2]	18.2
Cascades Inc.	171,725	23.7	3,706[2]	−76.8
Domtar Inc.	622,000	−1.0	9,000	−66.7
Donohue Inc.	152,831	−3.6	9,656	−43.3
Fletcher Challenge	359,500	2.4	28,500	−28.9
MacMillan Bloedel Ltd.	818,000	−0.8	65,400	−7.2
Noranda Forest Inc.	1,199,000	−0.2	45,000	−31.8
Repap Enterprises Inc.	331,800	27.6	19,600	−15.9
Rolland Inc.	107,700	−2.3	(2,813)	−240.2
Scott Paper Ltd.	124,991	53.9	3,377	−26.2
Total	**$5,665,947**	**1.1%**	**$266,726**	**−37.4%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. **Canfor:** 1988 quarter excludes gain of C$9.4 million. **Cascades:** 1988 quarter includes a pretax gain of C$3.37 million.

INTERNATIONAL PAPER POSITIONS ITS CONTAINERBOARD MILLS FOR THE 1990S

Incremental expansion projects at four IP mills could total $300 to $500 million over 1989-92 period and add 900 tpd

By WILL MIES, Executive News Editor

After spending more than $1 billion on modernization during the late 1970s and early 1980s, International Paper Co.'s Container Div. has been stressing productivity and efficiency rather than just volume. Although not the largest producer of containerboard and corrugated boxes—Stone Container Corp. is larger and Great Northern Nekoosa Corp. and Weyerhaeuser Co. are very close in size—IP believes that its four primary mills are among the most efficient in the industry.

Last year, the company's mills produced 2.1 million tons of containerboard, which was 8% of total U.S. production and 3% of total world production. IP's corrugated box plants produced over 1.6 million tons of corrugated boxes worldwide, giving it about a 5% market share in the U.S. and making the company the number one supplier in Western Europe with 7% of the market.

"We produced over 2 million tons of board on only five paper machines—no other company even comes close," noted Mike Harwood, general manager of the company's containerboard division. "Three of our five machines have trim widths in excess of 340 in., which is about 100 in. wider than the average U.S. linerboard machine, and in each of the past five years we established a new production record."

He provided a brief rundown on each of the company's four major containerboard mills:

- The Mansfield, La., mill, which came onstream in 1981, remains the last U.S. kraft linerboard mill built. "The decision to build Mansfield, which cost $600 million, was not an easy one, and we endured some tough years during recessionary periods in 1982, 1983, and 1985," Harwood noted. "Since then, however, Mansfield has become an exceptionally profitable operation. In fact, we believe that Mansfield's cash cost position is the lowest in the industry." The mill currently has capacity to produce 500,000 tpy of linerboard and 375,000 tpy of semichemical medium on its two 348-in.-trim machines.
- IP acquired its Pineville, La., mill in the late 1970s when the company purchased Bodcaw Corp. "Pineville has an excellent cost structure and is probably the only U.S. mill using a 100% virgin southern pine furnish," Harwood said. The mill has used its quality advantage to develop several specialty linerboard grades. The 260-in.-trim Pineville machine has a capacity of about 375,000 tpy.
- The Gardiner, Ore., mill is one of the lower-cost kraft liner mills on the West Coast and not only supplies the company's box plants but also serves quality-sensitive export markets, including Japan and China. Its 240-in.-trim machine has a capacity of 350,000 tpy.
- IP's Vicksburg, Miss., mill, long regarded as one of the most efficient mills in the industry, recently completed a $50-million modernization. Using "advanced densification" technology, the rebuild of the 345-in.-trim Vicksburg machine includes addition of new sequential Voith Flexonip presses—the first such double wide-nip press installation in the U.S.

The rebuilt machine will produce board with superior moisture control and stacking strength. Capacity will be increased by 83,000 tpy to 568,000 tpy, and energy costs will be reduced. With this enhancement, Vicksburg will secure its long-held position as the single most productive linerboard machine in the world, according to Harwood.

COST REDUCTION EFFORTS. IP's massive restructuring and modernization program in the late 1970s and early 1980s involved the closure of two mills (Springhill and Bastrop, La.), sale of its Panama City, Fla., mill, and reconfiguration of the Georgetown, S.C., mill to production of bleached pulp and paper grades.

Since then, the company's efforts have been directed

TABLE 1: **U.S. containerboard capacity (millions of short tons).**

Company	Liner	Medium	Total¹	Share (%)
Stone Container Container Corp.	2.8	1.0	3.8	14
International Paper Co.	1.7	.4	2.1	8
Weyerhaeuser Co.	1.4	.7	2.1	8
Great Northern Nekoosa Corp.	1.2	.9	2.1	8
Jefferson Smurfit Corp.	1.4	.6	2.0	7
Temple-Inland Inc.	1.4	.5	1.9	7
Union Camp Corp.	1.3	—	1.3	5
All others	8.3	3.4	11.7	43
Total	19.5	7.5	27.0	100

1. April, 1989.
Source: International Paper Co.

Mike Harwood, general manager of International Paper's Containerboard Div.

primarily toward cost reduction and mix improvement. "Our mill system has managed to increase linerboard and medium capacity by 930 tpd since 1982 without major capital. This is equivalent to obtaining a new world-scale mill," Harwood noted.

In addition, IP estimates that it has actually reduced its cost per ton of producing containerboard by 16%. "Some of this was due to declining energy and fiber costs, but much of it was the result of our cost reduction program," Harwood said.

IP believes that Vicksburg and Mansfield are two of the five lowest-cost linerboard machines in the U.S. industry. Pineville, despite an extremely complicated product mix, is also one of the more cost-efficient mills in the industry (Figure 1). Gardiner also holds a low cost position on the West Coast, although it has a less marked advantage over competitors in the region.

CAPITAL SPENDING FOR THE 1990s. In addition to Vicksburg, the company is also planning and engineering incremental expansions at its three other mills. The capital commitment for all four projects (including Vicksburg) is in excess of $300 million and could reach $500 million over the 1989-92 period, according to Harwood. "We expect to generate another 900 tpd from our facilities—at a capital cost well below that associated with new mills or new machines."

Following the Vicksburg rebuild, International Paper expects to use similar advanced densification technology at its other containerboard mills. The technology should enable IP to produce a sheet with only 1% moisture variation (meeting CID specifications), better smoothness, and improved porosity. Additionally, board will be wound into very tight solid rolls for high-speed corrugators, he noted.

Although the sequence of future densification projects has not been announced, the Gardiner, Ore., mill may be moved up in priority because of the need to reduce its wood costs, he indicated. Woodchip costs in the Northwest have more than doubled this year, partly due to strong demand from pulp mills, environmental constraints on timber harvesting, and demand for chips from the Far East.

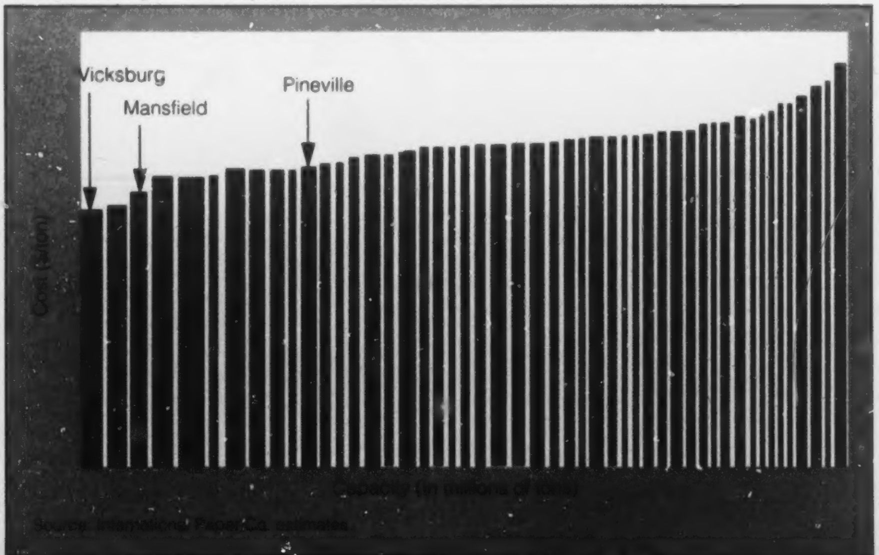
The company will also be spending at the converting level to expand its international box plants and streamline its U.S. box plant network. "In the U.S., we have closed a few unprofitable box plants, and we may sell or close other plants that do not meet our long-term strategic goals," Harwood said. IP earlier this year shut down a box plant in Manchester, N.H., but recently opened a new box plant in El Paso, Texas, which serves a fast-growing market in the southwestern U.S. and northern Mexico.

CHANGING MARKET REQUIREMENTS. International Paper is positioning its containerboard mill and corrugated box system to better serve growing market demands for high performance and more visual appeal, according to Harwood. Pineliner high-performance linerboard, which Pineville began to produce two years ago, has been the most successful new product ever introduced by IP's containerboard division. It permits box makers either to increase stacking strength or to save money by substituting a lighter Pineliner grade for a standard liner without losing compression strength. "Many box makers have used Pineliner to save 5% to 8% of material costs, so you can understand why this product has been so successful," stated Harwood.

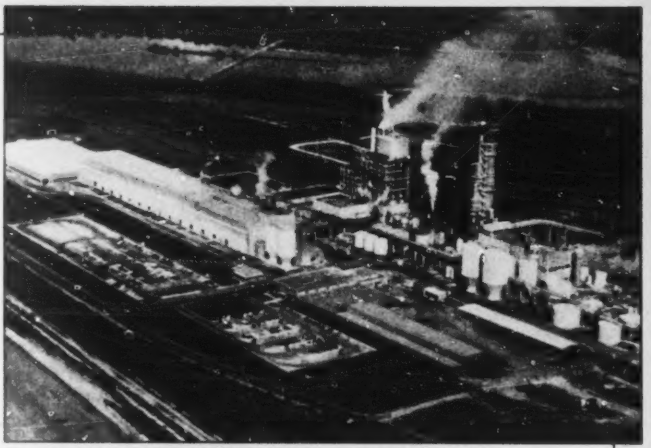
The company's newly introduced Classicpak box uses Pineliner to provide 20% to 25% better stacking strength than with conventional iced packed poultry boxes, which is a big advantage in a market that consumes 300,000 tons of corrugated boxes annually.

Harwood believes that by 1991, 20% of all boxes con-

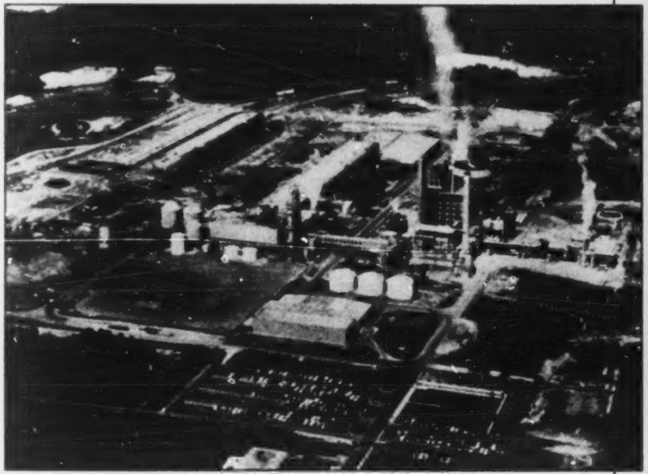
FIGURE 1: **Competitor cost position of southern U.S. linerboard mills in 1988.**



Source: International Paper Co. estimates.



IP recently completed a $50-million modernization of its Vicksburg, Miss., linerboard mill, including installation of sequential wide-nip presses.



IP's Pineville, La., linerboard mill, which produces specialty linerboard grades, is also in line for a major modernization program.

sumed in the U.S. will use high-performance materials, up from the current figure of 5% to 6%. Although many producers have begun to offer board with certain ring crush values, "high performance" also means having a sheet with good moisture profile, printability, and, above all, consistency, he said.

The move to high-performance containerboard is being driven by customer requirements rather than any movement to change Rule 41 or Item 222 freight classification rules, he indicated. Only about 35% of boxes made in the U.S. currently comply with the freight classification standards, he noted.

MORE VISUAL APPEAL. In addition to higher compression strength, customers are also interested in boxes offering more visual appeal. Harwood estimated that currently 22% of all corrugated boxes used in the U.S. have some form of visual appeal and that this will grow to more than 30% by the early 1990s. This growth would also include brown boxes that use three- and four-color graphics and boxes with bleached linerboard facings.

Harwood believes that much of the growth in visual appeal boxes will be in improved direct or postprinting of boxes rather than in preprinting. "U.S. converters have been adding a lot of three- and four-color flexo presses and diecutters, and our plants are no exception," he noted. For sophisticated multicolor work, however, IP has installed a modern preprint press at Shreveport, La.

For higher-quality graphics, IP produces Colorbrite bleached linerboard at its Georgetown, S.C., mill. It also offers an unbleached Colorbrite grade, which the company says is 20% smoother than standard liner, with high ink holdout and excellent formation properties.

IP was the largest producer of mottled white linerboard until 1980 but withdrew from the market when its Georgetown, S.C., mill was reconfigured. As indicated earlier, the company may reenter the mottled white market and begin producing white-top grades at its Pineville, La., mill.

In 1988, the U.S. consumed 1.068 million tons of mottled white linerboard (about 8% of total linerboard consumption) and 163,000 tons of solid bleached linerboard (1% of total consumption). Since most of this was used on only outer facings, the percentage of boxes offering visual appeal is considerably higher.

Mottled white consumption did not increase last year, mainly because of supply limitations, although bleached linerboard demand jumped sharply. Harwood believes that good opportunity exists in the U.S. for a white-top sheet, which would fill a gap between mottled white and clay-coated unbleached kraft board.

TABLE 2: **International Paper containerboard mill system.**

Mill	Trim width	Capacity (000 tpy)
Mansfield, La.	348 in.	600 (liner)
	348 in.	375 (medium)
Vicksburg, Miss.	345 in.	485 (liner)
Pineville, La.	260 in.	375 (liner)
Gardiner, Ore.	240 in.	350 (liner)

Source: International Paper Co.

FAVORABLE MARKET OUTLOOK. Despite last spring's unsuccessful price increase, domestic linerboard demand is still quite good, according to Harwood. However, he noted that there is "sufficient new capacity so that we don't expect to see the shortages and late deliveries that plagued box makers in the last two years."

IP estimates that U.S. linerboard capacity has been growing at an annual rate of close to 4% due to the large number of incremental expansion projects under way—even though only two new linerboard machines have been announced.

Harwood is optimistic about longer-run export demand for U.S. linerboard, particularly from the Far East. IP estimates the 1989 world market for containerboard at 69 million short tons, of which about 38% is recycled. The U.S., with 35% of total world consumption, is the largest consuming region, followed by the Far East and Western Europe. By the year 2000, the Far East should pass the U.S. in total containerboard consumption. ■

Buyers Guide 1990

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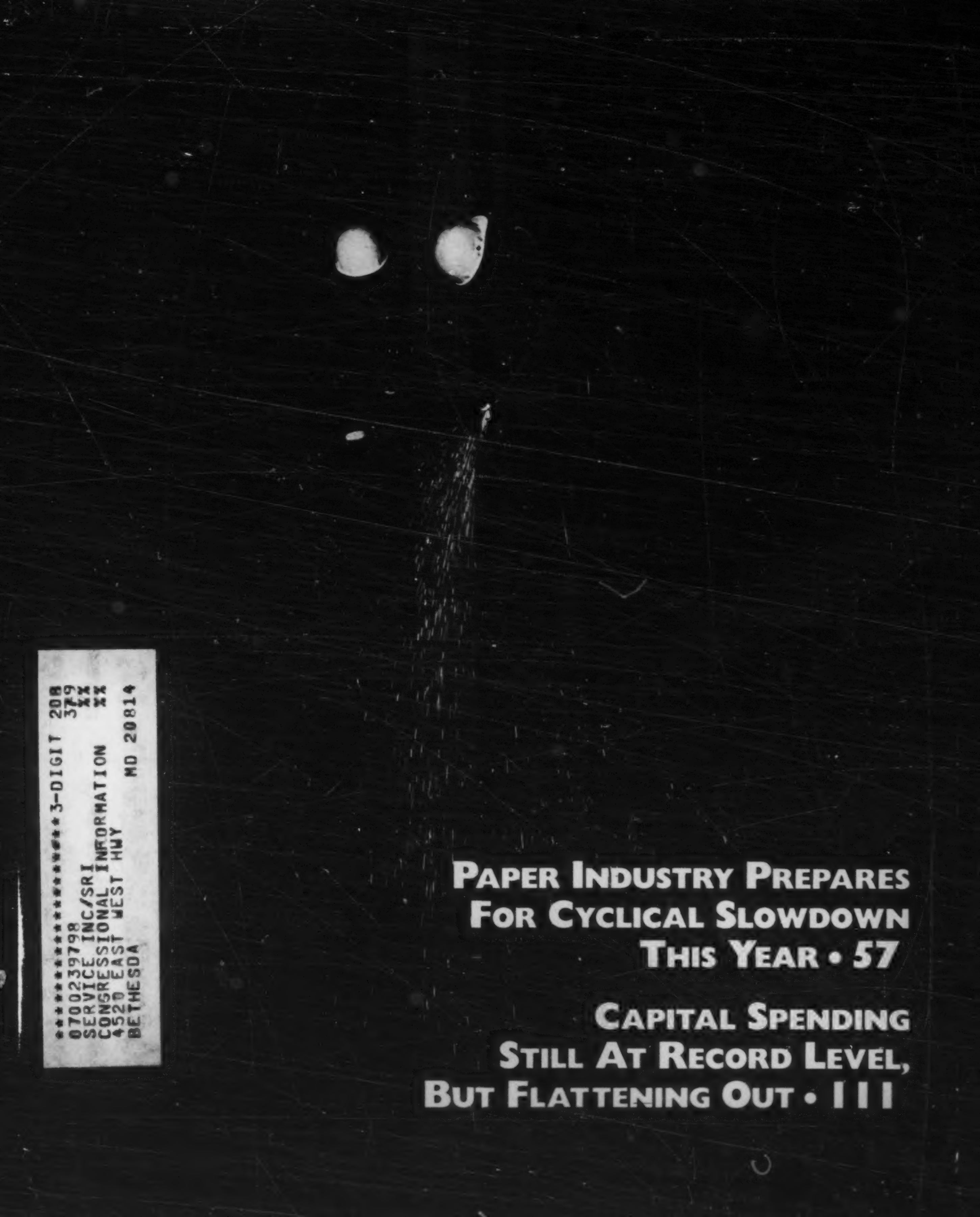
PULP & PAPER

January 1990



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Pulp & Paper's *Outlook '90 report (p. 57) indicates a gradual slowdown in operating rates, demand, and paper company profits beginning this year. However, expansion/modernization outlays are expected to stay at record levels, according to the special Capital Spending report beginning on p. 111.* (Photo of chemical pulp expansion at Consolidated Paper's Kraft Div. by Dick Durrance courtesy of Consolidated Papers Inc.)

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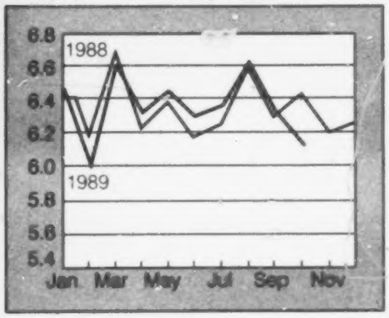
ABP

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.6 million tons in October 1989, an increase of 2.1% over the previous year, according to American Paper Institute data. After seasonal adjustments, the rate of production through the first ten months of the year stood at 76.5 million tpy, up 0.1% from 1988. Strength was concentrated in the paper sector, API reported, as white paper shipments continued to rebound from a period of consumer inventory reductions. Paperboard production has weakened, however, after a strong showing through the first eight months.

Among major grades, October shipments of printing and writing paper were the highest for any month since March 1988. Coated paper shipments jumped 10% after July to a record monthly average of 581,000 tons for August to October. Kraft paperboard production peaked in August at 1.70 million tons and then declined to 1.62 million tons in October.

Canadian newsprint shipments totaled 852,000 metric tons in October, up 6.1% from October 1988. Woodpulp shipments dipped 7.2% for the month to 610,000 tons. Operating rates at Canadian mills declined to 96% for newsprint and 90% for woodpulp during October. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Oct.	526	3.5	6,048	1.3
Uncoated groundwood (s)	Oct.	167	13.6	1,774	8.2
Coated paper (s)	Oct.	653	4.5	7,181	-3.2
Uncoated free-sheet (s)	Oct.	968	2.5	11,100	-1.9
Other printing/writing	Oct.	129	-0.8	1,526	0.9
Total packaging and other paper (s)	Oct.	438	0.9	4,915	-2.6
Tissue	Oct.	489	2.7	5,643	2.7
Total paper	**Oct.**	**3,369**	**3.2**	**38,186**	**-0.6**
Unbleached kraft paperboard	Oct.	1,624	3.0	19,622	1.4
Semichemical medium	Oct.	475	0.6	5,700	1.1
Bleached paperboard	Oct.	378	-0.5	4,543	0.6
Recycled paperboard	Oct.	759	-2.1	8,681	-2.2
Total paperboard	**Oct.**	**3,236**	**1.0**	**38,545**	**0.7**
Total U.S. paper and paperboard output	**Oct.**	**6,605**	**2.1**	**76,732**	**0.1**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Sept.	5,070	1.3	62,328	2.0
Market pulp production	Sept.	719	-1.1	8,867	3.2
Wastepaper consumption at paper/board mills	Sept.	1,590	2.4	19,043	0.9
Pulpwood consumption (cords)	Sept.	8,167	2.7	98,769	3.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Oct.	28.961	3.8	263.864[6]	1.5
Containerboard inventories at U.S. box plants and mills	Oct. 1	2,642	-1.2		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Sept.	1,061	-4.2	12,849	-0.3
Imports of Canadian newsprint	Sept.	652	-7.0	7,998[6]	-6.3
U.S. paper exports (including products)	Sept.	525	3.1	6,297	12.3
Exports of unbleached kraft linerboard	Sept.	167	-21.6	2,218	1.2
Exports of woodpulp	Sept.	548	5.8	6,398	16.6
Norscan pulp inventories[4]	Oct. 31	1,059	32.0		
Norscan pulp operating rates[4]	Oct.	92%	93%	101%	97%
CANADIAN STATISTICS[5] (reported in metric tons)					
Total newsprint shipments	Oct.	852	6.1	8,032[6]	-1.4
Operating rates	Oct.	96%	100%	95%	99%
Inventories held by U.S. consumers	Oct. 31	1,267	-16.5		
Other paper/board shipments	Oct.	607	8.0	5,638	1.2
Woodpulp shipments (export only)	Oct.	610	-7.2	6,473	-3.8
Operating rates	Oct.	90%	97%	96%	98%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Kraft linerboard: Mild downturn expected due to slower box cutup, new capacity additions

Unbleached kraft linerboard is made in a wide range of basis weights. Standard weight in the U.S. is 42 lb/1,000 ft² but other important weights are 26 lb, 33 lb, 69 lb, and 90 lb/1,000 ft². Major end use is in domestic corrugated container production, although about 13% of output is exported. Specialty grades include mottled white, solid white, and wet strength-treated board. Recycled linerboard production has grown close to 500,000 tpy but is not included.

Production: The U.S. linerboard market began to soften gradually in second-half 1989 after producers were unable to push through a price increase last spring. The main reasons for the easing in the market were slower growth in corrugated box shipments, restrained export demand, and increased industry capacity.

Box shipments were expected to be up about 1.9% in 1989, after growing at a 4.9% average annual rate over the 1986-88 period. Linerboard production for 1989 was expected to be up about 1.5% to 18.2 million tons. This would result in an operating rate of about 94.6%, down from 95.7% in 1988.

U.S. linerboard export shipments showed only modest growth in 1989 due to a strengthening in the dollar in the first half of the year, increased linerboard capacity overseas, and reduced demand from People's Rep. of China. U.S. linerboard production for export in 1989 was expected to be up about 1.5% to 2.33 million tons from the previous year, American Paper Institute statistics indicate.

Inventories of containerboard at box plants and mills dropped last fall and in October reached 2.45 million tons (4.9 weeks of supply)—a level slightly below the previous year.

Future outlook: Linerboard producers are expected to have a more difficult year in 1990. However, the downturn in the market is expected to be less severe than in 1982, when the U.S. experienced a major recession or in 1985 when the dollar was much stronger.

U.S. corrugated box shipments are projected to increase about 1.5% this year (assuming slower 1.7% growth in real GNP but no recession). Linerboard production is expected to be up 2.3% to 18.6 million tons, helped by an estimated 100,000 tons of inventory building at box plants. Operating rates for kraft linerboard mills are expected to decline from about 95% in 1989 to just below 94% in 1990—still a relatively high level.

U.S. linerboard exports are expected to increase by at least 5% in 1989 due to the weakness in the dollar, which has improved the competitive position of U.S. producers in world markets.

Capacity growth for kraft linerboard is expected to accelerate from 2.6% in 1989 to 3.1% this year and 3.9% in 1991. Gaylord Container Corp. will be bringing in a new 350,000-tpy machine at its Bogalusa, La., mill in the third quarter. Mead Corp. is also expected to start up its 375,000-tpy clay-coated kraft mill, which will initially produce some linerboard.

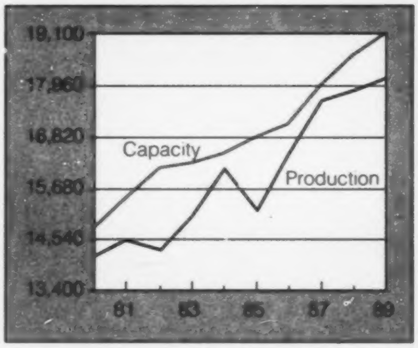
Prices: Since early 1986, linerboard producers have pushed through five $30/ton price increases, which took the price of 42-lb linerboard from $360 to $410/ton by spring 1988. Another attempt to raise prices by $30/ton to $440 in spring 1989 was unsuccessful due to strong resistance from independent converters.

The $410 U.S. list price on linerboard held through the end of 1989 although there were increasing reports of $10 and $20 spot discounts in the fall.

Stone Container Corp., the largest U.S. linerboard producer, has indicated plans for a possible $30/ton price increase on linerboard for Mar. 1, 1989. Nevertheless, there is skepticism regarding the success of the increase despite relatively high industry operating rates. Most analysts expect some erosion in price levels this year but not a collapse like the industry experienced in the first half of the 1980s.

Historical year-end prices for 42-lb linerboard delivered in the eastern U.S. open market (before zoned rebates): 1989, $410; 1988, $410, 1987, $380; 1986, $320; 1985, $260. (For more detailed statistical information, see *Pulp & Paper 1989 FactBook*).

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	1988	1989e	1990e
Production[1]	17,897	18,160	18,570
Capacity[1]	18,705	19,195	19,781
Utilization rate	95.7	94.6	93.9
Imports[2]	86	87	80
Exports[3]	2,296	2,330	2,445
Apparent U.S. consumption	15,687	15,922	16,210
lb/capita	127.4	127.9	129.1
GNP ratio[4]	3.99	3.83	3.83

e = Estimate.

1. Based on 1989 API capacity survey.
2. Dept. of Commerce.
3. API (includes some coated box board and specialty grades).
4. 1,000 tons/billion dollars real GNP.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity	Market share (%)
1. Stone Container	2,750	14.3%
2. International Paper	1,850	9.6
3. Weyerhaeuser	1,530	7.9
4. Jefferson Smurfit/CCA	1,450	7.5
5. Georgia-Pacific	1,375	7.1
6. Union Camp	1,350	7.0
7. GN Nekoosa	1,250	6.4
8. Temple-Inland	1,235	6.4
9. Packaging Corp.	800	4.2
10. Willamette	800	4.2

Market share of top five companies:
46.6%

Market share of top ten companies:
74.9%

Total U.S. capacity (1989):
19.195 million short tons

1. Includes all of Stone Container's 49% owned Seminole kraft mill in Jacksonville, Fla., Canadian capacity.
2. Excludes Inland's 205,000-tpy recycled liner mill in Ontario, Calif.

U.S. PAPER INDUSTRY IS PREPARED FOR CYCLICAL SLOWDOWN THIS YEAR

Operating rates will drop as capacity surges and demand weakens—leading to lower prices and profits

The U.S. paper industry's three-year period of soaring prices and profits reached a peak in third-quarter 1989. By the end of the year, weaker demand for the industry's products and shrinking backlogs of unfilled orders signaled a slowdown in the general economy and a reversal of the industry's boom cycle, which saw most grades of paper and paperboard in short supply. Instead of signaling a headlong plunge into an economic recession, however, the paper industry trend portends a gradual shift from an inflationary market to a slow deflation.

With the decline in inflation to below 5%, the Federal Reserve Board has allowed interest rates to decline, slowly at first but more rapidly since last October, to avoid a recession. Now that interest rates have declined to approximately 8.5%, and are projected to decline further, many paper industry executives hope consumers and businesses will resume spending and in so doing create an economic revival. "Rare is the economy that declines in an environment of falling interest rates," said Stephen Roach, senior economist at Morgan Stanley.

Paper company executives and financial analysts surveyed by *Pulp & Paper* openly acknowledged concerns about the industry's changing fortunes. However, none believe the paper industry is headed for a prolonged slump similar to the early 1980s, when a deep recession coincided with tough foreign competition and a strong dollar. U.S. paper companies have slashed costs dramatically in recent years and now are among the most effi-

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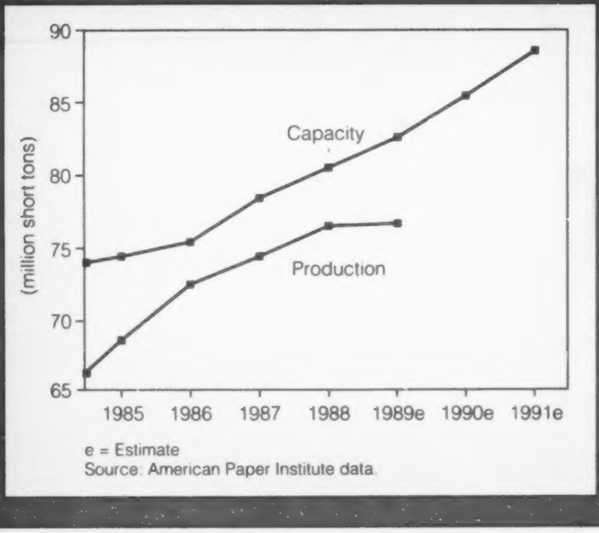
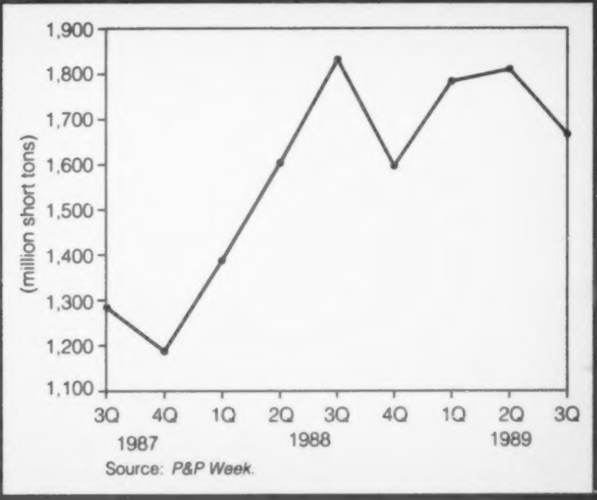
Outlook '90 was prepared by Pulp & Paper *news staffers Noel DeKing in New York and Regina McGrath, Debra Garcia, Rob Galin, and Will Mies in San Francisco.*

U.S. paper and board production is falling further behind capacity additions . . .



e = Estimate
Source: American Paper Institute data.

. . . and profits are suffering



Source: *P&P Week.*

cient and lowest-cost producers in the world. A spokesman for Champion International said, "We've gotten our costs down and we're better positioned for any cyclical downturn than we've ever been."

For 1990 and 1991, the principal concern is that demand growth will lag new supply, leading to lower operating rates and falling prices. After six years of strong GNP growth, averaging 4.1% annually, the U.S. economy has slipped into a period of slower growth, which is bad news for the paper industry, whose fortunes rise and fall with the economy. Merrill Lynch Economics forecasts real GNP growth to range between 1.5% and 2.5% during the next 18 months. The impact of this downward growth trend is not likely to be as severe on the paper industry as previous periods of real economic recession, when growth rates were negative. The consensus forecast of analysts surveyed by *Pulp & Paper* calls for a 1.9% gain in paper and paperboard production this year to about 77.8 million tons.

CAPACITY SURGE. Unfortunately, a 1.9% growth rate is not enough to keep U.S. paper mills running at full capacity while new capacity is being added. Paper companies spent a record $15.2 billion last year on new paper machines and related process equipment. The paper industry led all other U.S. manufacturing industries in the percentage increase of capital spending last year, a remarkable 35% increase over 1988. This heavy spending raised capacity an estimated 4.0% to 82.5 million tons, although output increased less than 1%. Thomas Clephane, an analyst at Morgan Stanley, expects capital spending to remain at about the same level in 1990, with the bulk of investment going into new incremental capacity expansions and modernization projects, rather than new greenfield mills or even new paper machines.

Paper companies are forecast to increase capacity by another 3.5% this year, raising total paper and paperboard production to over 85 million tons. Industry operating rates, the key barometer of the industry's health, are projected by some analysts to drop below 92% because of the surge of new capacity coming onstream this year. "We look for operating rates to decline because the industry is adding capacity faster than likely demand growth," said Sherman Chao, an analyst with Salomon Brothers. "This means that prices will drop, and the seller's market we've seen over the last few years will come to an end."

TABLE 1: **Analysts' projections for 1990.**

	Percentage change from 1989 levels (Unless otherwise indicated)								
	Growth in real GNP	Paper and Board production	Operating rates¹		Prices	Costs²	Earnings		Housing starts³
			Paper	Paperboard			Paper	Forest	
Thomas Clephane **Jeanne Carroll** Morgan Stanley	2.0	1.6	91.8	93.0	(1.0)	4.5	(20)	(15)	1.40
Evadne Lyns Merrill Lynch	2.0	3.4	94.1	92.7	(5.3)	3.0	(7.7)	16	1.43
Mark Kurland Mabon Nugent	1.5	1.5	93.6	93.1	(5.0)	3.0	(16)	(20)	1.40
Lawrence Ross Paine Webber	1.5	2.0	91.0	92.0	(2.0)	4.5	(8)	(6)	1.30
Thomas Farrell Deutsche Bank	1.0	0.0	93.0	92.0	2.0	2.0	(10)	15	1.30
William Wigder First Boston	2.0	2.0	90.0	91.5	(6.0)	4.0	(26)	5	1.40
Kathryn McAuley First Manhattan	2.2	1.0	92.0	94.0	(6.5)	3.0	(12)	(8)	1.50
Sherman Chao Salomon Brothers	1.9	2.0	91.9	92.8	(7.5)	5.0	(25)	15	1.48
Gary Palmero Oppenheimer & Co.	2.0	1.6	91.5	92.2	(7.6)	4.0	(16)	(25)	1.37
Mark Rogers Prudential Bache	3.0	3.3	92.4	82.1	(3.1)	2.0	(10)	(13)	1.55
Chad Brown Drexel Burnham Lambert	1.1	2.0	91.5	91.2	(2.7)	4.0	(25)	(15)	1.35
Mark Diverio Shearson Lehman Hutton	1.9	2.3	92.0	93.0	(5.0)	3.0	(6)	—	1.29
Average	1.8	1.9	92.1	92.2	(4.1)	3.5	(16.5)	(5.8)	1.44

( ) represents a negative figure.
1. Production as percent of capacity. 2. Costs per unit output. 3. Millions of units.

PRICE TRENDS. The signs of weakness in some paper grades are already evident as a result of supply/demand imbalances. Newsprint prices have fallen sharply, to about $540/metric ton, down 15% from a year ago. A projected addition of 2 million tons of North American capacity scheduled for 1989-90 will further erode prices and lead to permanent closures of older, inefficient newsprint mills, analysts say. "While this sector has already experienced a sharp deterioration of business, things could get worse before they get better," said Thomas Farrell, an analyst with Deutsche Bank Group.

Price discounting has also been widely reported in linerboard, certain grades of coated and uncoated paper, and hardwood and softwood bleached kraft pulps. "Many companies will have to be concerned about new and vigorous competition in market pulp, linerboard, and uncoated paper," said Gary Palmero, an industry analyst at Oppenheimer. "In downturns, that creates competitive price discounting pressure; it has existed before." Bleached paperboard prices are expected to remain firm, and possibly increase, because demand will outstrip available supply.

EARNINGS OUTLOOK. Most of the analysts surveyed agreed weaker demand and softer prices have dimmed earnings prospects for this year. Paper company earnings increased an estimated 5% last year to approximately $8.5 billion, after increasing 46% in 1988 and 43% in 1987. This year, some pessimistic analysts predict earnings will decline by as much as 25%, while more optimistic analysts predict a decline of 10% or less. Even a severe decrease, however, would not roll back profits to pre-1987 levels. Additionally, earnings estimates of most paper companies already reflect an expected profit slump, so the share price of these companies may fall only 5% to 10%, said Lawrence Ross of Paine Webber.

The largest earnings declines are projected for commodity-oriented paper companies that produce a majority of pulp, newsprint, and containerboard grades. Their prices are likely to be more volatile in the future. Chao believes even uncoated free-sheet is increasingly becoming a commodity-like paper grade subject to wide price swings. Compared with commodity paper producers, analysts project better earnings for paper companies with strong consumer products businesses and wood products businesses because of strong prices for tissue products, woodchips, lumber, and plywood. Earnings of paper companies that are net purchasers of market pulp will also benefit from lower pulp prices.

WEAK DOLLAR. Evidence of a weakening U.S. economy has put downward pressure on the dollar, which is good news for U.S. exporters. The dollar rose 15% at midyear to its high of DM 2.03 and ¥ 149 on June 14, then dropped to DM 1.85 and ¥ 143 by last November. A further 10% decline is expected in 1990 as a result of rising interest rates in Fed. Rep. Germany and Japan, which should sustain the U.S. paper industry's high export volume. Merrill Lynch's Evadna Lynn expects the dollar to stabilize within the recent range, compared with the steady weakening during 1985-88. This stabilization should cause price trends for export-influenced grades to be more influenced by the supply/demand balance than exchange rate trends.

In 1989, pulp exports jumped approximately 15%; paper grades, mostly newsprint, rose an astounding 43%; and paperboard grades, mostly linerboard, increased 10%. A sharp drop-off in orders from People's Rep. China hurt linerboard exports, but export growth in other Asian markets was strong. Exports of bleached paperboard, mostly milk carton stock, also showed good growth in Asian markets.

TABLE 2: **Industry operating rates.**

	Operating rates (%)				
Paper	**1985**	**1986**	**1987**	**1988**	**1989e**
Newsprint	93.8%	97.0%	97.3%	97.5%	95.0%
Uncoated groundwood	89.0	91.4	90.5	95.7	94.2
Coated paper	88.2	92.9	93.1	94.0	88.6
Uncoated free-sheet	92.2	94.4	95.4	94.8	89.4
Bristols	87.8	96.6	93.0	96.2	96.2
Thin paper	80.4	79.2	82.8	79.3	75.1
Cotton paper	77.0	79.2	82.3	83.6	79.1
Packaging and industrial	87.0	88.9	90.2	93.6	90.2
Tissue	92.4	93.1	96.3	97.3	97.6
Total paper %	**88.5%**	**93.2%**	**94.2%**	**95.2%**	**91.6%**
Paperboard					
Kraft linerboard	90.7%	95.5%	98.5%	96.2%	94.6%
Other kraft	84.3	88.9	82.5	60.0	83.9
Total	**90.2%**	**95.8%**	**91.1**	**93.7**	**87.5**
Semichemical	94.0	96.7	97.4	97.7	95.2
Bleached board	90.3	93.3	94.2	95.7	96.0
Recycled	86.8	89.7	92.8	92.8	90.2
Total paperboard %	**88.8%**	**93.5%**	**93.2%**	**95.2%**	**94.1%**
Total paper and paperboard %	**90.2%**	**93.5%**	**93.2%**	**95.2%**	**94.1%**

e—Estimated.
Source: American Paper Institute and Pulp & Paper estimates.

On the domestic side, imports of market pulp were down an estimated 1%, and newsprint was down 7%. Imports of uncoated groundwood paper and bleached printing bristols increased more than 10%. Most of these are from Canada, which accounts for 75% to 80% of foreign shipments to the U.S. The 1988 U.S./Canada Free Trade Agreement has given a tremendous stimulus to the Canadian paper industry. Tariffs on cross-border trade of all paper products will be completely removed by the end of 1992. The output from a number of new paper machines currently being installed in Canada is destined for the large U.S. market. At the same time, some large U.S. linerboard producers hope to gain additional business in Canada.

CONSOLIDATIONS. Stone Container Corp.'s $2.2-billion acquisition of the Canadian company Consolidated-Bathurst Inc. was the most significant consolidation in the paper industry last year. The merger with Canada's fifth-largest pulp and paper company boosted Stone Container to the second-largest pulp, paper, and paperboard producer in the world. The acquisition gave Stone a greater stake in market pulp and newsprint and a foothold in the European market. International Paper Co. and James River Corp. have also made strategic acquisitions in Europe to strengthen their role in the European single market that will emerge in 1992.

Last November, Georgia-Pacific Corp. announced a 3.18-million hostile takeover bid for Great Northern Nekoosa Corp. The potential merger would create the largest paper and forest products company in the U.S. and a major competitor on a global scale. The purchase of Great Northern would easily eclipse G-P's $545-million purchase of Brunswick Pulp & Paper Co. and the $220-million purchase of American Forest Products Co. L.P. in 1988. If it is successful, the merger would make G-P the leading U.S. producer of kraft linerboard, uncoated white business paper, and market pulp and a major supplier of corrugated containers.

TABLE 3: **Industry production.**

	Production (000 tons)				
Paper	**1985**	**1986**	**1987**	**1988**	**1989e**
Newsprint	5,428	5,630	5,482	5,982	6,019
Uncoated groundwood	1,521	1,540	1,498	1,624	1,761
Coated paper	5,875	6,263	6,860	7,359	7,109
Uncoated free-sheet	9,690	10,410	10,986	11,277	11,042
Bristols	930	990	1,052	1,150	1,173
Thin paper	262	247	240	217	196
Cotton paper	144	152	163	187	159
Packaging and industrial	5,204	5,117	4,955	5,047	4,882
Tissue	4,941	5,096	5,301	5,476	5,618
Total paper	**33,995**	**35,444**	**36,876**	**38,288**	**37,959**
% change	**−1.3%**	**4.3%**	**4.0%**	**3.8%**	**−0.8%**
Paperboard					
Kraft linerboard	15,183	16,402	17,683	17,897	18,301
Other kraft	1,185	1,287	1,216	1,244	1,335
Total	**16,368**	**17,689**	**18,899**	**19,140**	**19,636**
Semichemical	5,088	5,376	5,536	5,664	5,700
Bleached board	3,948	4,271	4,406	4,511	4,544
Recycled	7,630	8,083	8,601	8,789	8,639
Total paperboard	**33,034**	**35,419**	**37,442**	**38,105**	**38,519**
% change	**−3.8%**	**7.3%**	**7.2%**	**1.8%**	**1.1%**
Total paper and paperboard	**67,029**	**70,863**	**74,318**	**76,403**	**76,477**
% change	**−2.1%**	**5.7%**	**4.9%**	**2.8%**	**0.0%**

e—Estimates. Source: American Paper Institute.

UNCOATED FREE-SHEET

MARKETS LIKELY TO REMAIN COMPETITIVE

■ Markets for uncoated free-sheet paper turned very competitive in 1989, and observers both inside and outside the industry expect 1990 to continue that competitive trend. The problem is a combination of major expansions and inventory corrections resulting from panic orders during the continuous price increases of mid-1986 through early 1988.

But the market all but collapsed upon itself in 1989 and prices plunged downward, sometimes as much as $100 or more off list. Most industry sources expect (or hope) prices will stabilize and perhaps gain back some lost ground.

Operating rates may be in the low 90% range with demand growth at about 2.5% to 3% for the year, according to Dana G. Mead, executive vice president, International Paper Co. He does not foresee any end-use segments becoming particularly weak and, in fact, sees some strength in every grade.

Uncoated free-sheet has undergone a tremendous growth in capacity in recent years, including four new machines in Canada since 1987 and three in the U.S., plus incremental expansion. All told, capacity has increased about 8%—almost 1 million tons—in three years. However, new capacity coming onstream in 1990 will be at the end of the year (Willamette Industries Inc., Bennettsville, S.C., and Boise Cascade Corp., International Falls, Minn.), so it will not be seriously felt in the marketplace until 1991.

Of equal importance, analysts project 1% to 2% growth in the gross national product (GNP), rather than a recession. A recession could have affected business paper use and advertising. John Maine, vice president printing and writing paper at Resource Information Systems, expects an economic slowdown with GNP growth at 1% to 1.5%, bringing industry profits lower in 1990 than they were in 1989.

Shipments of uncoated groundwood paper in North America will increase about 5.6% in 1990, compared with 5.7% for all printing and writing grades, according to Evadna Lynn, first vice president at Merrill Lynch Capital Markets.

SEGMENTS GROW LESS THAN 5%. Essentially all segments of the uncoated free-sheet sector are projected to post growth rates of less than 5% in 1990. The strongest area is bond and writing paper, which will grow about 4.1% based on continuing strong demand for cut-size copy paper (also used in computer page printers). Bond and writing is the largest end use, followed closely by offset, which is expected to advance only 2.9% in 1990. The third major group is forms bond, which is affected by growth in cut-size. Paper shipments for this end use will match the growth of offset.

Carbonless paper, a small but quickly growing use, is expected to calm down from its recent double-digit growth and settle at just 2.0% for 1990, though demand will pick up again as the economy turns around in the next few years.

Envelopes, both white wove and kraft combined, will gain slightly less than 3% in 1990, with white wove doing slightly better than kraft. Cover and text and tablets will do even better, with growth of 4.0% and 3.7%, respectively.

COATED PAPER

NEW CAPACITY OUTSTRIPS DEMAND

■ New capacity for coated paper, especially coated groundwood grades, is moving strongly ahead of demand, although demand may be two or three times as high as the rate of general economic growth. As a result, operating rates are likely to hover in the low 90% range and possibly even lower, some observers say.

Papermakers generally remain optimistic about coated markets, though both coated free-sheet and coated groundwood will be competitive from a pricing standpoint.

Dana G. Mead, executive vice president of International Paper Co., said a lot of coated free-sheet is coming onto the market, but demand is likely to be up at least 2.5% to 3% for the year, and probably higher. Thus, competitive pricing will be induced more by supply than demand, he said.

Another optimistic note is sounded by Patrick F. Brennan, president of Consolidated Papers Inc. He said customers, particularly publishers, have indicated they plan to take full contract tonnage in 1990. Coated free-sheet demand remains strong, and Consolidated still has its premium No. 1 Reflections grade on allocation. Brennan "is aware of additional capacity coming onstream."

Consumer spending is likely to rise in most areas where advertising is heavy, such as food and apparel, but perhaps not in automobiles, according to Norma Pace, president of Economic Consulting & Planning. Therefore, modest expansion will occur in grades of paper that serve these areas.

In the area of inserts/coupons, Pace sees a possible growth slowdown. "You can't help but sense we're coming up against a stalling market there, that people are not responding to coupons as they did before," she said. Inserts primarily use coated groundwood paper (about 783,000 tons in 1988) and newsprint (720,000 tons in 1988), according to Andover International Assn.

In end-use segments, magazines continue to do well, as will catalogs and commercial printing (direct mail, circulars, annual reports, etc.), said John Maine, vice president—printing and writing paper, Resource Information Systems.

Evadna Lynn, first vice president at Merrill Lynch Capital Markets, expects coated groundwood shipments to rise 8.3% in 1990 from last year and coated free-sheet to increase 8.5%.

Operating rates for counted groundwood will be about 90.3% in 1990, the same rate as in 1989, estimates Jeanne K. Carroll, analyst at Morgan Stanley.

NEW CAPACITY CREATES PROBLEMS. A number of new machines will affect the market in 1990. Blandin Paper Co. started up its 254,000-tpy coated groundwood machine late in third-quarter 1989, and effects of that tonnage will be felt this year. (Blandin postponed addition of a second lightweight coated [LWC] machine at Grand Rapids, Minn., because of current market conditions.) Also starting up in late 1989 was Repap Enterprises Inc.'s 200,000- to 250,000-short-tpy machine at Newcastle, N.B., which will swing between coated groundwood and coated free-sheet. These machines will add to the competitiveness of the coated groundwood market in 1990, according to Maine.

Westvaco Corp. plans to start up its new 100,000-tpy coated free-sheet machine at Wickliffe, Ky., sometime in first-quarter 1990. In addition, Scott Paper Co. will start up a 215,000-tpy lightweight coated free-sheet machine at Skowhegan, Maine.

The European market, where publication grade paper will be in abundant supply, will also provide pressure, according to the European Paper Institute (EPI). EPI's *Paper Capacity Report for Woodcontaining Publication Papers in Reels* says the coated mechanical side is likely to be hit hardest, with operating rates dipping to 84.1% in 1990 and 81.2% in 1991, compared with an estimated 96.3% utilization rate in 1988 and 91.4% in 1989.

EPI estimates coated mechanical capacity will rise from 4.044 million metric tpy in 1988 to 6.178 million tons in 1993, not including planned projects, which have not received final approval. These projects could add more than 400,000 tons to the total.

TISSUE

MORE CAPACITY, STABLE DEMAND

TABLE 4: **North American tissue expansions.**

Startup date announced	Company	Mill	Annual capacity (short tpy)
Apr. 1987	Fort Howard Corp.	Rincon, Ga.	88,250
Feb. 1988	Georgia-Pacific Corp.	Palatka, Fla.	35,000[1]
Apr. 1988	Fort Howard Corp.	Rincon, Ga.	88,250
Oct. 1988	James River Corp.	Clatskanie, Ore.	70,000
Late 1988	Tagsons Papers Inc.	Mechanicville, N.Y.	n.a.
Apr. 1989	Fort Howard Corp.	Green Bay, Wis.	n.a.
Aug. 1989	Fort Howard Corp.	Rincon, Ga.	88,000
Sept. 1989	Vicell Canada Tissue Ltd.	Delta, B.C.	9,000
Nov. 1989	Irving Tissue Co.	St. John, N.B.	75,000
Dec. 1989	Atlas Paper Mills	Hialeah, Fla.	14,000
Dec. 1989	FSC Paper Co.	Alsip, Ill.	70,000
Jan. 1990	Atlantic Packaging Corp.	Whitby, Ont.	43,000
Feb. 1990	Cascades Inc.	Kingsey Falls, Que.	31,300
Mid- 1990	Wisconsin Tissue Mills	Menasha, Wis.	80,000
Late 1990	Kimberly-Clark Corp.	Loudon, Tenn.	34,000
1990	Kimberly-Clark Corp.	Jenks, Okla.	68,000
Mid- 1991	Fort Howard Corp.	Rincon, Ga.	88,000
1991	Perkins Papers Ltd.	Candiac, Que.	28,000
Proposed			
n.a.	American Tissue Corp.	Natchez, Miss.	n.a.[2]
n.a.	James River Corp.	n.a.	n.a.[3]
n.a.	Potlatch Corp.	Lewiston, Idaho	n.a.[4]
n.a.	Fort Howard Corp.	n.a.	n.a.[5]
n.a.	Scott Paper	n.a.	n.a.[6]

n.a. — Not available.

1. Incremental capacity expansion from rebuild.
2. Conversion of Diamond International Corp.'s idle molded pulp mill.
3. Will start up two tissue machines between 1989 and 1994.
4. Studying rebuild of machine.
5. Seeking permits to expand its mills in Green Bay, Wis., and Muskogee, Okla.
6. Planning greenfield tissue mill in U.S., will add rebuilt machine at Chester, Pa.

■ In January 1989, Procter & Gamble Co., the market leader in consumer bathroom tissue, led a 9.8% price hike on consumer bathroom tissue sold east of the Rocky Mountains and an 8.0% increase in markets west of the Rockies. An increase of such size is unlikely to occur early this year because the economy is slowing down. Also, tissue mills no longer can cite rising pulp prices as an excuse for raising prices.

One has to take announcements of price increases in the consumer tissue market with a large grain of salt. Discounting to maintain market share often erodes price increases, and hikes are often postponed for as much as six months after an announcement. For example, last July, Scott Paper Co. said it lost some market share in the premium branded market because competitors lagged in implementing the hike announced in January. Producers can also manipulate sheet counts to give themselves de facto price increases. Generally, producers are lucky if they can implement half the amount of the announced increase in such a competitive market.

In a slower economy, consumers are likely to trade down to lower-priced tissue, which will hurt the large consumer tissue producers—P&G, Scott, and James River Corp. They will also be more inclined to buy private-label tissue products. Private-label napkins currently outsell all the national brands. People are likely to eat out less often, which will curtail demand for commercial and industrial (C&I) tissue.

In October 1989, Fort Howard Corp. announced it was increasing the price of its towels, toilet paper, napkins, and facial tissue sold on the C&I market by 5% to 7%. Fort Howard is the market leader in the C&I sector, with about a 31% market share. The company is said to be running its mills at capacity, and to avoid long lead times on orders, it decided to raise prices. Fort Howard could also use the money from the price hike to help fund its plans to add three new tissue machines over the next five years and pay down some of the debt incurred during its leveraged buyout. Competitors, like Scott, James River, Georgia-Pacific Corp., and Marcal Paper Mills Inc., supported the increase. Industrial paper merchants were surprised by the increase, which came at a time of weakening demand, and few felt it would stick.

Traditionally, C&I producers have slated two price increases a year, one in the spring and one in the fall. Given the weakening market, however, a price hike this spring is doubtful unless the increase announced last fall fails completely.

NEW CAPACITY COMES ON. Several new tissue machines started up late last year, which should ease the tight supply situation some producers have been complaining about but will also make it harder to keep prices up. In addition to Fort Howard, Scott has announced it will add capacity in North America and is evaluating various mill sites. It reportedly is planning to build a very large recycled tissue machine. Last fall, Scott Paper Ltd. said it would build a 300-air-dry-metric-tpd bleached chemi-thermomechanical pulp (BCTMP) mill at its 170-metric-tpd tissue mill in Crabtree, Que., at a cost of C$110 million. The mill will supply the Crabtree mill as well as Scott's tissue mills in the U.S.

Two recycled tissue machines started up in second-half 1989. The third machine at Fort Howard's Savannah River mill in Rincon, Ga., started up in August. And FSC Paper Co.'s 70,000-tpy machine in Alsip, Ill., was expected to come online in late November or December. Irving Paper Co. started up a 75,000-tpy tissue machine based on virgin kraft pulp last November. Atlantic Packaging Corp.'s 43,000-short-tpy machine in Whitby, Ont., is slated to start up in January. Three more machines are slated to start up this year (Table 1).

Perhaps one of the more interesting developments is Cascades Inc.'s announcement that it is making "environmentally friendly" toilet tissue, adult diapers, and sanitary napkins at its mill in Kingsey Falls, Que., using 100% BCTMP from its Port Cartier, Que., mill. Cascades is the first established North American paper company to position its products this way, following the lead of the Scandinavians.

CONTAINERBOARD

MORE DIFFICULT TIMES AHEAD

■ Signs of softness began to appear in the U.S. linerboard market in second-half 1989. The first indication the market might be turning came last spring when producers were unable to push through a $30/ton price increase from the current $410 list level. By fall, reports of $10 to $20/ton spot discounts off the list price were made in the Northeast and some other sections of the country.

Some of the pressure on prices was probably coming from independent converters whose margins were squeezed by the sharp run-up in roll-stock prices over the 1986-88 period. Partly due to the need of such customers to get cost relief, corrugating medium prices began to erode during the summer months and dropped by $30 to $40/ton in some regions.

Pressure may also have come from linerboard price erosion in offshore markets, which made exporting less attractive to U.S. producers and may have contributed to a buildup in mill inventories. U.S. linerboard production for export through the first nine months of 1989 was up only about 1%, according to American Paper Institute (API) statistics. Nevertheless, inventory levels at both the converting and mill levels remained relatively low through September and were 2.5% below a year ago when the market was considered to be tight.

INCREMENTAL PROJECTS ADD UP. Some observers worried because the softness occurred even though U.S. corrugated box shipments were still fairly healthy. Box shipments in third-quarter 1989 were up 3.0% from a year ago, bringing the year-to-date increase to 2.3%. "If mills are being this competitive now, think what it will be like if we have a recession," one agent remarked.

Another factor blamed for the surplus linerboard tonnage sloshing around the market last fall was the large number of incremental expansion projects under way in the industry. Nevertheless, the last API survey (1988) showed capacity was supposed to have increased only 2.5% last year. That rate will accelerate to 3.7% in 1990 and increase further to 4.9% in 1991.

Gaylord Container Corp. will bring on a 350,000-tpy machine at its Bogalusa, La., mill in second-half 1990, following the rebuild of the large machine at its Antioch, Calif., mill, which will add about 140,000 tpy. Some industry executives are worried about how well all of this new tonnage will be marketed by the new and financially leveraged company—although it will take at least several months for the machines to reach design capacity, the company recently noted. In addition, Mead Corp. will probably begin producing linerboard on its new 420,000-tpy clay-coated kraft board machine later this year.

DIFFICULT YEAR—BUT NO REPEAT OF 1985. As a result, many analysts expect the industry to have a fairly difficult year in 1990—although most don't expect a price collapse like the industry experienced in the 1982 or 1985 market downturns.

For example, Thomas P. Clephane of Morgan Stanley expects the industry to operate at 95%, which "is much higher than the 84% in 1982 and 91% in 1985. There was also a 10% capacity increase in 1981-82 coupled with a severe recession. The U.S. dollar valuation and export demand are totally different from those of 1985, when there was a 20% decline in linerboard exports from the 1983 level." He projects linerboard prices will erode only slightly later this year and bottom at $390 in first-half 1991.

More pessimistic is Evadna Lynn of Merrill Lynch, who sees linerboard operating rates declining to 92 to 93% in 1990 with domestic linerboard prices dropping to the $350 level by second-quarter 1990.

Even some industry executives have admitted to more difficult times ahead. Box converters can expect better margins because of "the substantial amount of containerboard capacity coming onstream over the next three years," Victor A. Casebolt, senior vice president of International Paper Co., told the Assn. of Independent Converters last fall. Nevertheless, he expects operating conditions to be good, with a "better balanced and more stable" market than during the tight 1986-88 period.

STILL SOME OPTIMISTS. One company that remains optimistic is Stone Container Corp., which last fall advised customers to expect a $30/ton price increase this March on linerboard and kraft paper. "Linerboard list prices will then reach $440/ton, a price considerably below the $500/ton level we feel must be attained in order to justify a new greenfield mill expansion," the company said in a letter to customers.

New longer-range opportunities for linerboard producers will also open in 1990. The market for white linerboard grades offering better printing quality for visual appeal boxes seems to be taking off, according to a new *Pulp & Paper Forecaster* report. Demand for white linerboard will grow 6%/year over the 1988-92 period, with the fastest growth in white-top grades, said its author, Coleman Rowland of Lakeway Research. "High-performance" containerboard is also expected to show rapid growth and may account for 30% of total production by 1992, according to the report.

As a result, linerboard may become less of a commodity. And the companies that have invested to reduce costs and improve product quality should be in a stronger position if the market does turn down.

BOXBOARD

STEADY GROWTH TREND EXPECTED

■ Producers of bleached, unbleached, and recycled boxboard grades should enjoy steady demand for these paperboard packaging grades in 1990. Solid bleached sulfate (SBS) capacity additions will be limited to incremental machine rebuilds during the year, so supply and demand should remain in balance and operating rates should remain at 96% through the end of the year. A large addition of coated kraft board capacity in late 1990 could lead to excess market supply in early 1991.

Production of bleached board increased only 1% in 1989, following a 2% increase in 1988. Capacity increases have averaged only 1.1% annually during the past ten years, so the bleached board industry has been capacity constrained for the past two years. Producers have dedicated virtually all available machine capacity to bleached board production and produced fewer than 5,000 tons of bleached pulp in 1989, according to industry reports. Still, demand exceeds domestic supply, but Canadian suppliers have moved rapidly to fill the gap.

Tembec Inc., Montreal, Que., hopes to fill this niche when it starts up a new 140,000-metric-tpy, three-ply coated solid bleached board machine in early 1990. The new paperboard operation at Temiscaming, Que., is a joint venture with Jefferson Smurfit Corp. Smurfit will also be one of the primary purchasers of the board, which is expected to compete with SBS. Last year, Cascades Inc. began producing a similar double-white, three-ply folding carton board that has replaced SBS in a number of packaging applications.

Recycled paperboard production was down about 2% last year, largely as a result of an 8% decline in gypsum wallboard production. Output of the recycled packaging grades, including folding carton, was up about 3%. Recycled mills producing folding carton stock reported strong orders throughout the year due to the shortage of SBS board and the increasing price differential with SBS. At the end of 1989, 15-pt coated SBS was selling for approximately $830/ton, while 20-pt clay-coated newsback (CCN) was selling for about $480/ton and coated kraftback for about $510/ton.

Unbleached kraft folding boxboard, which accounts for about 18% of the folding boxboard market, increased about 9% last year. Most of the coated kraft board produced by Mead Corp. and Manville Corp. is used in the beverage carrier market, where the increased use of multi-packs and exports has spurred growth. At the same time, both producers have expanded their folding carton businesses to replace SBS and CCN. Coated kraft board prices fall between these two grades, and 20-pt folding carton stock sells for $615 to $620/ton.

HAVE PRICES PEAKED? Following two $50/ton SBS price increases in 1989, Merrill Lynch's Evadna Lynn expects only one price increase this year, in the fall. Westvaco Corp. and Federal Paper Board Co. will each start up new paper machines in 1992, but until then only incremental SBS capacity expansion is planned. Milk carton exports, which have averaged about 13% of total production in recent years, should keep pace because International Paper Co. and Potlatch Corp. will be increasing capacity to produce liquid packaging.

IP forecasts worldwide demand for liquid packaging board to grow 4.3% annually to over 2 million tons by 1995.

Recycled boxboard producers did not raise prices in 1989, although most producers pushed through three price increases in 1988, each averaging about $30/ton. As a result, prices for newsback and kraft-back board remained firm.

Producers saw wastepaper fiber costs steadily diminishing during the year, which offset the need for a price increase. Boxboard prices vary $10 to $15/ton for producers located in different regions of the country based on different wastepaper costs. Prices also vary by the basis weight and quality of the multi-ply boards manufactured by different producers. Recycled chipboard and converting boxboard prices remained largely unchanged last year, averaging between $340 and $360 tons for 20-pt bending chipboard grades.

NEW KRAFT MACHINE. Mead is on schedule to start up a new 360,000-tpy coated unbleached kraft paperboard machine in late 1990 at the company's Mahrt mill near Phenix City, Ala. Mead's coated board division plans to market much of the machine's output overseas, but domestic markets will not be overlooked. Growth rates for this boxboard grade have outstripped both SBS and recycled grades in recent years, and coated kraft folding carton board has found a good niche between the two competing grades. Of course, Tembec also hopes to capture some of these same niches. Both Mead and Manville raised coated kraft boxboard prices last year, and they should be able to raise prices again this year if demand stays firm. Some potential exists for market oversupply at the beginning of 1991, but Mead has announced that if the new machine's output is not entirely sold, the company could produce lightweight linerboard on the same machine.

WASTEPAPER

OLD NEWSPAPERS GLUT MARKET

■ The most remarkable characteristic of paperstock markets in 1989 was that some of the low grades no longer behaved as one would expect if just supply and demand were taken into account. Why? Because a growing number of states and municipalities passed legislation mandating separation and collection of old newspapers.

About 20 states will have laws on the books by the end of this year requiring residents to separate ONP from their trash in an effort to cut down on the volume of trash entering landfills. Many politicians fail to grasp that mandatory collection does not mean recycling since mills can use only so much ONP. Far fewer bills have been passed requiring ONP to be used in specific end uses, such as newspapers. Two federal laws introduced late last year would require a certain amount of ONP to be used in newsprint production, and they will be taken up again this year. At the end of last year, only three states had laws on the books to stimulate demand for ONP, and all of these were focused on newspaper publishers.

The advent of mandatory collection laws caused the transaction price of ONP to enter negative numbers in some parts of the country. For example, the price of ONP in the Northeast during last October was −$25 to $5/ton. The mountains of ONP in that region, where mandatory collection in the U.S. started, has caused some paper companies to announce that they are studying the possibility of building mills to use up the resource. Among these are Jefferson Smurfit Corp. and Garden State Paper Co.

The weak ONP market has dragged down the price of boxboard cuttings. Mills that formerly used this grade are using ONP instead so they can help their communities use up the ONP. Similarly, mills that once used new double-lined kraft corrugated clippings are using more old corrugated containers (OCC) in an effort to keep this postconsumer paperstock grade out of the landfills.

Deinking grades exhibited the strongest demand of any paperstock grade in 1989, and this trend is expected to continue in 1990. Mills that were loathe to pay historically high prices for pulp substitutes traded down to deinking grades. In addition, an estimated 40% of fiber consumed by tissue mills in the U.S. is secondary fiber. Tissue demand will not fall off as sharply as commodity grades of paper during an economic downturn. Demand for deinking grades is forecast to remain strong in 1990.

Also, a plethora of printing/writing paper producers are studying the use of postconsumer grades of paperstock to make a recycled sheet of paper suitable for use in office copiers and computers. Nekoosa Papers Inc. introduced a 50% recycled content xerographic sheet last fall. Others studying such projects include a joint venture between Cascades Ltd. of Canada and Steinbeis of Fed. Rep. Germany (*P&P*, Nov. 1989, p. 39), Domtar Inc., and James River Corp., Halsey, Ore. (*P&P*, Nov. 1989, p. 29). Hammermill Paper Co. introduced a recycled copier paper last October, but unlike Nekoosa's, the paper contains preconsumer wastepaper grades. These projects will use mainly high-grade deinking stocks and possibly some pulp substitutes, although Steinbeis reportedly can make its computer printout paper out of 100% ONP.

As one might expect, the price of pulp substitutes mirrors that of woodpulp. Discounting of hardwood pulp began in the third quarter of last year and continued through the end of the year. A corresponding drop in the price of pulp substitutes was observed. Prices for pulp substitutes are not expected to show much upward movement during the first half of 1990.

A discussion of U.S. paperstock markets is not complete without noting what is happening on the export market. An economic slowdown in the U.S. means U.S. consumers will be less likely to buy goods from Japan. This, in turn, will cut down on Japan's need to import OCC from the U.S. to make boxes to ship these goods to the U.S. The export market to the Far East is traditionally slow during the beginning of the year because that is when the Chinese New Year is celebrated. Additionally, the unrest in People's Rep. China and that economy's dire straits will continue to curtail wastepaper demand. Rep. Korea recently brought online a number of deinking lines, so demand for manifold white and colored ledger will be bolstered. And Mexico should continue to exhibit healthy demand for OCC in 1990 since new recycled linerboard capacity has come onstream.

For more information on the U.S. wastepaper market and the effects of mandatory recycling legislation, attend "Wastepaper I: Demand in the '90s." Sponsored by Pulp & Paper magazine and Pulp & Paper Week, the conference will be held May 14-15 at the Westin Hotel, Chicago, Ill. Contact Bill Rutledge at (415) 995-2472 to register.

CANADIAN INDUSTRY

COMPANIES BRACED FOR YEAR OF LABOR TALKS, LOW PROFITS, AND SHUTDOWNS

The year ahead will be a tough one for the Canadian industry. Already suffering from the pounding taken from exchange rates and eroding newsprint markets, producers are gearing up for further deterioration in other sectors, such as market pulp, and are hoping the U.S. economy doesn't slide into a recession later in 1990.

Canadian industry earnings were on the downside for most of last year. Beginning with severe deterioration in newsprint profits, the erosion crept into virtually all sectors by year-end 1989. Weaker markets were reported by third-quarter 1989 in paperboard, packaging products, and white paper, as well as in hardwood kraft pulp. Market pulp, perhaps the industry's greatest asset in 1989, could be the grade hardest hit this year.

Shipments from Canada were severely affected in 1989 by a stronger Canadian dollar. Through the first nine months of 1989, the Canadian dollar averaged US84¢ compared with US81¢ in the same period of 1988. A one-cent increase in the value of the Canadian dollar against its U.S. counterpart costs a company like Noranda Forest Inc. C$9 million after taxes and costs Fletcher Challenge Canada Ltd. C$6 million, according to Price Waterhouse.

Canadian companies, though, have been responding to increased competition by upgrading old facilities, building new mills, and shutting down or converting older and less efficient machines. Capital spending plans are likely to be curtailed somewhat this year as the industry's cash flow is squeezed. "The difficulty will be in finding internal and external sources of cash to fund them," noted Brian Topp, forest products analyst with Capital Group Securities, Toronto, Ont. He expects Canadian earnings will be halved in 1990 and that operating rates will drop across the board, with pulp about 92% and newsprint in the low 90% area.

SPENDING MAY BE CURTAILED. Major expansions and modernizations already under way should not be

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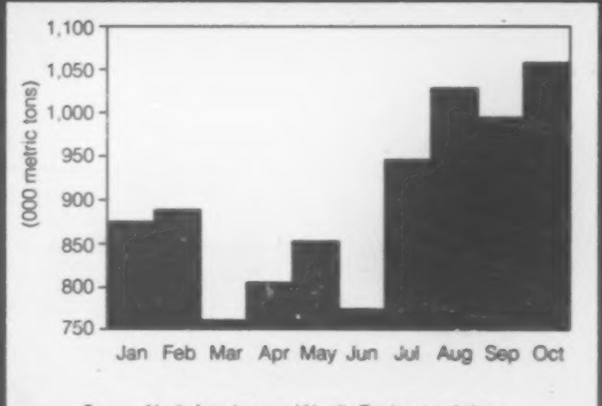
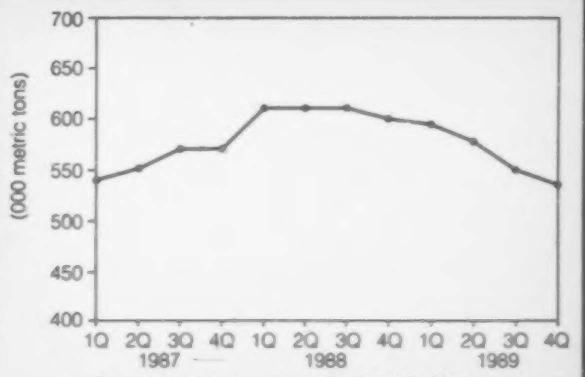


Source: North American and Nordic Trade association.

[illegible] while newsprint prices are declining



Estimated transaction price in Eastern U.S. ($/metric ton).
Source: *P&P Week*.

affected by curtailment of spending. As a result, capacity in such grades as newsprint and printing/writing will expand substantially in a short time. According to the Canadian Pulp & Paper Assn.'s most recent capacity survey, printing/writing capacity will increase 41.3% over the period 1988-91. During this time, newsprint capacity will rise a less substantial 14.7% but will involve the addition of nearly 1.5 million metric tons.

In 1990, Canadian companies should continue substantial spending on foreign capital projects and acquisitions. Joint ventures have added viability to some of these investments by combining companies' skills in technology and marketing as well as by pooling finances. Cascades and Steinbeis Group of Fed. Rep. Germany, for instance, have joined together on a recycled printing/writing mill to be sited somewhere in eastern Canada or the northeastern U.S.

Cascades Inc. and other Canadian companies have also invested in other markets. Abitibi-Price Inc. has newsprint projects under way in the U.S. (in partnership with Parsons & Whittemore Inc.) as well as in Venezuela (in partnership with Bowater Inc.), Scotland (North British Newsprint Ltd.), and the U.S.S.R.

Canadian producers have become increasingly concerned about global markets in recent years as nontraditional suppliers have increased capacity. In addition, trade agreements worldwide have changed markets. The Canada-U.S. Free Trade Agreement is not expected to have a significant effect on Canadian producers in the near term. The opportunity provided by the agreement for improved access to U.S. markets for printing and writing paper is partially offset by the need to restructure some Canadian companies' domestic operations in the face of increased competition in the Canadian market.

In Europe, Canadian companies have sought investments to assure future access and a competitive position relative to European suppliers. This positioning will become a bigger concern as the European Community gets ready to tear down trade barriers and unite the Common Market in 1992.

EXCHANGE RATES A PROBLEM. The weakening of the U.S. and Canadian dollars in relation to other major currencies improved Canadian producers' competitive positions in overseas markets in recent years. However, this improvement was more than offset by decreased realizations from Canadian sales in U.S. dollars as the Canadian currency strengthened last year. The chief commodities affected were pulp and newsprint.

Export opportunities for pulp and paper shipments are expected to shrink in 1990 due to the stronger Canadian dollar. Many industry observers expect the Canadian dollar will remain at about US84¢ U.S. this year. Overseas expansions in newsprint and other grades will reduce demand for imports in such key markets as Europe. Pacific Rim markets will remain good, however.

Another issue Canadian mills will grapple with in 1990 is increasing environmental concerns. Concern over dioxins has already resulted in Canadian pulp producers committing millions of dollars to upgrading operations, such as adding oxygen delignification equipment. The issue of a dwindling forest base has also taken hold across Canada but has been most vocal in the West.

ENVIRONMENTAL ISSUES SURFACE. In Alberta last year, citizens groups slowly began to fight the bevy of mill expansions being considered over the next few years. One or more of six projects may be shelved, and others have been delayed by more stringent and timely government review processes. MacMillan Bloedel Ltd. began a campaign in British Columbia to inform the public of its forest management practices. Other provinces are also taking a closer look at forest management agreements.

The Canadian industry will also be investigating ways to add recycled fiber capacity at mills—particularly those producing newsprint—as U.S. legislation aimed at requiring greater use of recycled newsprint and other grades is expected to become more widespread in 1990 and 1991. This will be a key problem for the industry, as many mills are in remote areas. Shipping wastepaper great distances—particularly to mills surrounded by abundant pulpwood supplies—may prove unfeasible.

One of the most prominent items on the Canadian industry's agenda for 1990, though, is labor negotiations. Contracts covering the majority of mill workers in eastern Canada are due to expire on April 30. It appears the chances of a prolonged strike are very good.

LABOR TALKS COULD BE HEATED. Modest net profits will give companies more leverage in labor bargaining in 1990, though eastern Canadian unions may be determined to bring their wage increases back in line with those negotiated in recent years in British Columbia, noted Topp. He expects the unions will want 6% to 7% wage increases.

Ross Hay-Roe, analyst with McCarthy Securities, Vancouver, B.C., expects companies may actually prefer to shut down for awhile "given the current state of the mills' profitability, their own inflated inventories, and the industry's morbid focus on all the new capacity starting up."

If strikes would, in fact, provide an opportunity to work off inventories, mills will probably take advantage of it. Canadians took the brunt of the downtime in 1989. Newsprint mills alone took over 200,000 metric tons off the market last year, with most of this occurring in eastern Canada in first-half 1989. Kraft sack and fine paper producers also curtailed operations, though not as significantly. More downtime is expected in 1990, and it is likely to affect more sectors more significantly than last year.

NEWSPRINT

SLUGGISH DEMAND AND EXCESS SUPPLY

■ North American producers are gearing up for a third consecutive year of lackluster returns in the newsprint business. Profits, which have been on a downward slope since late 1988, should continue in that direction through much of 1990. Newsprint prices are expected to drop even further, leading to more production curtailments, machine conversions, and permanent closures.

Late in 1989, market observers were not prepared to say the worst was over. As one sales executive noted, "If you think this is bad, wait till it gets worse." In 1989, newsprint downtime in North America amounted to over 200,000 metric tons. Virtually all of this downtime was taken by mills in eastern Canada, which has a greater number of older mills than other regions of North America.

The cost to manufacture and deliver a ton of newsprint produced in Canada in 1989 averaged about $474/metric ton, compared with $405 in the U.S. West and $418 in the U.S. South. (These figures are 1989 estimates based on a newsprint cost study updated in 1988 by the Forest Sector Advisory Council of the Canadian government.) In addition, a stronger Canadian currency further reduced returns from sales denominated in U.S. dollars.

With average transaction prices for newsprint delivered to U.S. East markets dropping to $540/metric ton by late 1989, some high-cost producers began to lose money. Newsprint prices have been dropping since mid-1988 and are expected to continue falling in 1990. Most industry observers are calling for the slide to level off at about $500/metric ton, and they don't expect another price increase until 1991.

Many market observers did not anticipate the newsprint market would deteriorate as rapidly as it did in 1989. It was especially surprising considering operating rates stayed above 95% throughout most of the year. However, the expectation of rising North American newsprint capacity later in 1989 through 1991 led to increased discounting. By the fourth quarter, average discounts were in the high teens, and the largest buyers were getting more than 20% off of the $650/metric ton list price in the U.S. East.

Morgan Stanley analyst Jeanne Carroll estimates that newsprint transaction prices will fall to about $523/metric ton in 1990. As a result, North American newsprint producers' profit margins, on average, will fall by 95% between 1989 and 1990 to just $7/metric ton.

The average operating profit of Canadian companies (before interest expense and income taxes) will probably decline 40% from C$130 to $40/metric ton in 1988 to C$80 to $90/metric ton in 1989 and drop even further in 1990, according to Jim Rowland, editor of *Canadian Paper Analyst*. Unanticipated strength in the Canadian dollar vs the U.S. counterpart could lead to an even larger percentage decline, he noted.

Brian Topp, forest products analyst with Capital Group Securities, projects another 5% drop in newsprint prices in first-half 1990. Newsprint producers are most liable to be under pressure from publishers to drop prices early in the year, when their profit margins will be squeezed the most, noted Topp.

However, Ross Hay-Roe, industry analyst with McCarthy Securities, expects actual prices to remain fairly stable in the first half because of increased demand. Publishers will rebuild inventories as a hedge against possible strikes in eastern Canada. Labor contracts covering most mill workers in that region expire on April 30, and some industry observers feel the chances of a prolonged strike are high.

Hay-Roe indicated that the newsprint industry has already seen the worst from the current down cycle. He expects inventory rebuilding by publishers alone should boost consumption by 425,000 metric tons in 1990. At the same time, capacity increases previously slated for early in the year have been delayed until mid-year or later, and one startup was pushed back until 1991.

The Canadian industry will continue to invest in a number of new machines in the next two to three years. At the same time, many older machines will be shut down. Some announcements of machine shutdowns were made in 1989, and more are likely to follow in 1990. The older and less efficient machines that are not idled are likely to be converted to groundwood specialties.

However, in the near term, the Canadian newsprint industry is expected to be in a period of declining profits. Substantial downtime will occur in second-half 1990, unless significant losses in production result from strikes or other causes. Even U.S. producers, relatively untouched by curtailments in the current market downturn, will take some downtime to control inventories.

North American operating rates will average 89.9% in 1990, down from an estimated 95.9% in 1989 because of a 2.8% rise in capacity in 1989, followed by a 7.5% increase in 1990 and a projected boost of 2.5% in both 1991 and 1992, according to Morgan Stanley projections. "The average newsprint producer might very well operate in the red in 1991," noted Carroll. "Of 21 companies followed by Morgan Stanley, only Bowater [Inc.] . . . enjoys a significant cost advantage, with operating margins at 24.4% in 1988 compared with the average of 19% to 21%."

Jaak Puusepp of Pemberton Securities, Vancouver, B.C., expects newsprint operating rates to drop to about 90% in 1990 and hover there until about 1993. North American exports to Europe will not grow significantly during this time because European capacity will also be increasing rapidly. Opportunities for exports to the Pacific Rim, though, remain good.

Besides normal market factors of demand and supply, the newsprint industry will have to cope with increasing pressure to add deinking capacity. As more laws requiring publishers to use recycled newsprint are adopted in 1990, producers will be forced to take action to protect market share.

In 1989, virtually every North American newsprint company was already weighing solutions to the recycling problem. Many announcements of capital investments in deinking equipment are expected in 1990. Companies such as Garden State Paper Co. and Smurfit Newsprint Co. are selecting sites in the northeastern U.S. for greenfield newsprint mills, and numerous others will look at ways to incorporate recycled fiber into existing facilities.

Only about 9% of current North American newsprint output is made from recycled fiber. The U.S. industry is comparatively in a much better position, with about 22% of its capacity using wastepaper, while Canadian recycled newsprint capacity is only 2% of the total. Canadians are also in the worst position to add recycling facilities, as most mills are in remote areas surrounded by timberlands. Transporting wastepaper to these regions will be costly. In the U.S., however, mills may encounter problems in obtaining necessary permits.

UNCOATED GROUNDWOOD

NEWSPRINT SOFTNESS AFFECTING LOW END

■ Softness in the bloated newsprint market is causing low-end uncoated groundwood paper to suffer as well, and overcapacity in coated groundwoods is helping make pricing more competitive in the high-end supercalendered (SC) grades.

In fact, future demand for newsprint and groundwood-based uncoated publication paper grades will be constrained by a slowdown in general economic growth, said Christian Wijnberg, vice president at Salomon Bros.

"Even if future growth in general economic activity exceeds our expectations, there are a number of factors specific to groundwood and newsprint which will constrain future growth," Wijnberg said.

Prospects for groundwood paper are mixed because of increases in postal rates and efforts by newspapers to provide more targeted audiences for their customers, which will have a negative influence on demand from direct mail customers, Wijnberg explained.

In 1988, about 10% of paper consumed for direct mail in the U.S., including catalogs, was uncoated groundwood, according to Andover International Assn. Uncoated groundwood also represented about 31% of paper used in free-standing inserts.

SC PAPERS CONTINUE STRONGEST GROWTH. John Maine, vice president—printing and writing paper at Resource Information Systems (RISI), projects demand for groundwood paper to grow about 1.5% in 1990, after a 0.4% drop in 1989.

John G. Davis, executive vice president of the Printing Papers Group at Abitibi-Price Inc., suggested the following growth rates in the next five to ten years for uncoated groundwood paper:

- Directory paper, 2% to 4%/year
- Forms paper, 3% to 5%/year
- Machine-finished groundwood paper, decline of 2% to 5%/year
- "Smooth" paper (primarily SC), 8% to 10%/year.

RISI's Maine sees generally good prospects for SC growth in catalogs, inserts, and other segments. He also expects continued growth in directory paper. Maine also predicts a renewed emphasis on groundwood forms, including some based on recycled fiber.

Stone-Consolidated's mill in Grand'Mère, Que., will produce the only major capacity due onstream in 1990 in North America. The new machine, which has a soft calender, will produce approximately 183,000-short tpy of uncoated groundwoods. Theoretically, the new machine is designed to make anything from rotonews to high-grade SC. Another 77,000 tpy of unfilled or low-filled SC will be available through conversion from newsprint at Kruger Inc.'s Corner Brook, Nfld., mill. Lake Superior Paper Industries has postponed the addition of a second 240,00-tpy SC-A machine for the time being.

EUROPEAN CAPACITY ALSO A FACTOR. The oversupply of newsprint and coated paper that will affect uncoated groundwood is also occurring in Europe. Slowing demand has also cut imports to the U.S., which may exacerbate the European situation.

Maine said U.S. mills will have about 48% of the U.S. groundwood market in 1990, down slightly from 1989 when the full impact of new capacity was felt from Lake Superior's SC machine in Duluth, Minn. Canada will boost its share from 39% in 1989 to 42% in 1990. European producers will drop from 11% in 1989 to 10% in 1990.

The European Paper Institute's (EPI) *Paper Capacity Report for Woodcontaining Publication Papers in Reels* indicates that from 1988 to 1993, SC magazine will advance 1%/year while other uncoated grades will grow at 5%/year for the next five years. Perhaps a more important factor will be the burgeoning newsprint and coated paper markets, which are likely to drop substantially under 90% utilization in 1990.

Increased demand in markets using SC magazine paper is also encouraging capacity expansion in that area, though operating rates are expected to be 93.3%, down from 95% in 1989. Utilization will drop to 90.5% in 1991.

Few new SC projects are under way or planned and capacity will rise from about 3.021 million metric tpy in 1988 to 3.310 million metric tpy in 1993, according to EPI. Potential projects could add another 300,000 metric tpy if they proceed.

The balance of uncoated wood-containing paper represents a small portion of the market. Capacity growth in this area is relatively minor, and operating rates will be approximately 94.4% in 1990, down from 104.2% in 1989. Operating rates are projected to fall further to 91.2% in 1991.

Capacity will rise from 1.031 million metric tpy in 1988 to 1.413 million metric tpy in 1993, EPI says. The growth comes through speedups, changes in product mix, and other factors.

MARKET PULP

AFTER THE PARTY IS OVER

■ The three-year run-up in pulp prices enabled pulp producers to achieve record prosperity in 1989. Now North American producers have their fingers crossed that they can get through 1990 with only moderate erosion in prices and not the collapse some forecasters are predicting.

Market pulp demand began to weaken last year as papermakers, first in the U.S. and then in Europe and Japan, began to reduce pulp inventories. Meanwhile, North American and Nordic producer pulp inventories began to climb, hitting 1.06 million metric tons by the end of October, up from the low of 666,000 tons at the end of 1988. The total number of North American and Nordic pulp shipments was expected to decline approximately 1% last year, with shipments to the U.S. down about 5%.

All of the classic early symptoms of a market downturn began to appear in pricing by the fourth quarter: increased availability of supposedly off-spec pulp, fairly open discounting ($15 to 30/ton) on southern mixed hardwood and pine on the lower end of the quality spectrum, and more aggressive discounting of all types of pulp in more out-of-the-way Mediterranean and Third World markets.

Nevertheless, only minor discounting was reported off the benchmark northern bleached softwood kraft pulp price of $840/metric ton ($830 domestic) in major world markets, and there was some hope producers would be able to at least hold list prices in first-quarter 1990. Among causes for optimism were a weakening dollar, which opened a wide gap with local currency prices in Europe, downtime announcements by Nordic and some eucalyptus producers, and some pickup in U.S. printing/writing paper production following an inventory reduction that depressed demand through most of last year.

BULGE OF NEW CAPACITY. Most analysts, however, expect pulp prices to drop in 1990 due to slower economic growth, startup of new capacity, and increased substitution of pulp by wastepaper and fillers. Major pulp expansions scheduled to be completed this year include Weyerhaeuser Paper Co.'s new 350,000-tpy line at Columbus, Miss., and Daishowa Forest Product's 340,000-tpy line at Peace River, Alta. World chemical paper-grade pulp capacity growth is expected to pick up from 1.4% in 1989 to 3.0% in 1990 and 3.1% in 1991, with even higher growth likely in 1992-93 when several greenfield mills in Latin America begin to come online.

In addition, two more Canadian bleached chemithermomechanical pulp (CTMP) mills (Donohue-Matane and Alberta Energy) will start up later this year. These two mills would bring the total amount of new CTMP capacity added in Canada over the 1986-90 period to more than 1 million tpy. The new CTMP producers are expected to price fairly aggressively to develop markets for their new pulp, particularly in printing/writing paper markets.

HOW DEEP A DOWNTURN? Rodney Young of Resource Information Systems (RISI) expects the price of northern bleached softwood kraft to bottom at about $680/metric ton in the first part of 1991—a relatively optimistic forecast based on slower economic growth (but no recession) and further weakness in the dollar (projected to decline to DM 1.7).

RISI expects world shipments/capacity of chemical paper-grade market pulp to average 91% in 1990, compared with 97% to 98% for the mid-1986 to mid-1989 period. With shipments forecast to be about 7% lower than what the industry can actually produce, about 2 million tpy of capacity will have to be shut down to bring the market into balance. "Normally, the way this occurs is that prices have to come down to the cost levels of producers in the higher cost countries, such as Scandinavia, northern Europe, and Japan, which are then forced to shut down."

The weaker dollar would provide a much higher floor for dollar pulp prices than existed in the 1985 market downturn, Young notes. However, if the dollar remained strong (for example, DM 1.9), "our dollar price forecast would be considerably lower." RISI expects market pulp demand to rebound in 1991-93, with shipments rising 6%/year helped by strong growth in printing and writing paper and tissue, particularly in Europe and Japan.

A recent forecast by Robert Bishop and Sherman Chao of Salomon Brothers reflects how far pulp prices could fall if the dollar does not weaken. They estimate pulp prices will fall at least $300/ton by the end of 1991, with northern bleached softwood kraft hitting $520/ton before higher-cost capacity is shut down—based on constant exchange rates (before late November's weakening in the dollar).

LABOR

THE 1990s: ERA OF CONCILIATION

■ Labor/management relations during the 1990s in the U.S. pulp and paper industry are expected to focus on job security, health and retirement benefits, work rule flexibility, and moderate wage increases. Strikes may be a thing of the past in the wake of the United Paperworkers International Union's (UPIU) unconditional end to a 16-month strike against International Paper Co. in October 1988. In 1989, only one strike occurred: UPIU members at Little Rapids Corp., Potsdam, N.Y., have been on strike since March 1989. The company hired 80 permanent replacement workers to run the facility. The threat of permanent replacement will curtail the unions' willingness to strike.

Companies continue to phase out premium pay for Sunday and holiday work. The practice of giving lump-sum payments in the first year of the contract is now practically an institution among the larger companies, enabling paper companies to curtail their unit labor costs (*P&P*, Sept. 1989, p. 244). And companies in 1990 will continue to try sharing health care costs with their hourly employees. Standard contract length is about three years. More contracts are being negotiated for four and five years than for one and two years—a reversal of historical trends.

Wage increases through the first nine months of 1989 averaged 1.0% in the first year, 2.5% in the second year, and 2.5% in the third year, according to American Paper Institute statistics. This compares with a median first-year wage increase of 3% for collective bargaining settlements in manufacturing industries, according to the Bureau of National Affairs. But it is better than 1988, when average increases were 0.7%, 2.0%, and 2.1%.

UPIU has been looking for other bargaining strategies, since striking has gotten it nowhere. It tried the concept of pooled voting—several locals working for one company decide at the outset that certain issues (such as premium pay) would be subject to a majority ratification vote by all the locals. UPIU tried to use this strategy against IP, Champion International Corp., and Georgia-Pacific Corp. Last fall, Region 3 of the National Labor Relations Board (NLRB) ruled that a complaint should be issued against UPIU and against locals of the International Assn. of Machinists and the Firemen & Oilers for their use of pooled voting against Champion. Champion charged the unions had bargained in bad faith and threatened multiple strikes.

Union members still can try the "if you can't beat 'em, join 'em" approach. Employee involvement in work teams and more autonomy for work units will become more common and may provide employees with more satisfying jobs and companies with more profitable mills.

IP STRIKE EPILOGUE. International Paper Co. and Local 14 of UPIU began negotiating the terms of a new three-year contract about a year after the union unconditionally ended a 16-month strike at the mill. Talks initiated by the company began Oct. 16, 1989. IP is seeking to amend and extend provisions under the contract proposals it implemented in October 1987 and is also offering wage and benefit increases. About 1,150 hourly workers are employed at the mill, and 110 of those are strikers who have been rehired. UPIU's counterproposal seeks a reinstatement of premium pay for Sunday and holiday work—the issue that caused the strike.

The permanent replacement workers hired to run the Jay, Maine, mill during the strike have filed a decertification petition, but until all charges of unfair labor practices filed by the union against the company have been settled, no vote on union decertification can occur. Replacement workers at IP subsidiary Nicolet Paper Co. in De Pere, Wis., voted 316 to 2 not to be represented by UPIU Local 6288. Although the vote occurred Sept. 14, 1988, the votes were not counted until Oct. 17, 1989, because of pending unfair labor practice charges. The only people eligible to vote in the election were replacement workers.

Meanwhile, last fall, four UPIU locals employed by IP mills at Pineville, La., Kaukauna, Wis., Merrill, Wis., and Ticonderoga, N.Y., were attempting pooled bargaining. The locals also filed a charge of unfair labor practices against IP with NLRB and said they have a right to coordinate their efforts. (NLRB had not ruled in the matter by press time.)

NEGOTIATIONS IN EASTERN CANADA. On Apr. 30, 1990, the three-year contract covering members of the Canadian Paperworkers Union (CPU) in eastern Canada will expire. The last contract was settled without a strike, but it is not certain the same will be true of this round. Some of the companies in eastern Canada, like Abitibi-Price Inc., are suffering from weak newsprint markets and will be reluctant to agree to large wage increases while the industry is trying to absorb new capacity coming onstream during 1989-91. (Abitibi is usually the company that CPU negotiates with first, and the contract agreed upon is then used as a pattern for the rest of the industry.) Last fall, Domtar Inc. announced it was cutting 500 salaried positions, partly because it has sold off its chemical division. But a company doing this kind of belt tightening is not likely to be generous at the bargaining table.

In contrast, CPU has signaled it wants a wage increase of 5.5% in the first year, which is the same increase union members in western Canada will get in 1990 under their contract. (The contract in the West expires in 1991.) During the last contract negotiations, CPU members in eastern Canada agreed to lower wage increases than their counterparts in the West and may feel they have to even this score.

Irving Pulp & Paper Ltd., Saint John, N.B., settled a new contract with CPU in October 1989, and national CPU leaders were involved in negotiations, so the contract settled provides a hint of what CPU may be trying for in all of eastern Canada. In addition to the 5.5% wage increase, CPU may be asking for 4% vacation pay. For every week of vacation taken, union members would be paid 4% of their gross wages from the previous year. Another way of looking at it is that union members will receive about two weeks' pay for every week of vacation.

TABLE 7: **Major contracts by region on 1989 bargaining calendar of U.S. paper industry.**

Company	Mill location	Union	No. of employees	Contract expires
Southern region				
Halltown Paperboard	Halltown, W.Va.	O	102	1/31
James River	Richmond, Va.	U	77	4/28
ITT Rayonier	Jesup, Ga.	U,B,A,O	896	6/30
Jefferson Smurfit	Jacksonville, Fla.	U,B	252	6/30
Macon Kraft	Macon, Ga.	U,B,A	462	8/28
Champion International	Canton, N.C.	U	1,482	8/31
International Paper	Pine Bluff, Ark.	U,B	951	8/31
Valentine Pulp & Paper	Lockport, La.	U	123	9/03
[illegible] Packaging	Valdosta, Ga.	U,B	365	9/15
Inland Container	New Johnsonville, Tenn.	U	139	10/31
New England region				
Madison Paper Industries	Madison, Maine	U	235	4/30
Champion International	Bucksport, Maine	U,B,A,O	1,042	5/01
[illegible] Paper Div.	[illegible]	U	82	5/31
Haverhill Paperboard	Haverhill, Mass.	U	114	6/01
S.D. Warren	Westbrook, Maine	O	1,258	6/01
James River	Berlin, N.H.	U	1,246	6/24
Merrimac Paper	Lawrence, Mass.	U	97	6/30
Strathmore Paper	Turners Falls, Mass.	U	94	6/30
	Westfield, Mass. and Woronoco, Mass.	U	415	6/30
Federal Paper Board	Versailles, Conn.	U	160	7/10
Great Northern Paper	Millinocket	U	1,184	
	E. Millinocket, Maine Millinocket E. Millinocket, Maine	B,A,[illegible]	826	
[illegible]	Fitchburg, Mass.	U	338	7/31
	Fitchburg, Mass.	O	29	8/08
James River	E. Pepperell, Mass.	U	114	8/21
[illegible] Cascade	Brattleboro, Vt.	U	180	8/31
Pacific region				
Georgia-Pacific	Toledo, Ore.	W	430	1/01
[illegible]	Snowflake, Ariz.	U,B	400	3/01
Boise Cascade	St. Helens, Ore.	W	432	3/15
Boise Cascade	Vancouver, Wash.	W	248	3/15
Boise Cascade	Wallula, Wash.	W	310	3/15
[illegible]	Cosmopolis, Wash.	W	272	3/15
[illegible]	[illegible]	W	189	3/15
[illegible]	[illegible]	W	806	3/15
[illegible]	North Bend, Ore.	W	183	3/15
[illegible]	Springfield, Ore.	W	[illegible]	3/15
[illegible]	[illegible]	W	[illegible]	[illegible]
[illegible]	[illegible]	W	[illegible]	[illegible]
[illegible]	[illegible]	W	[illegible]	5/01
[illegible]	[illegible]	W	[illegible]	5/01
[illegible]	[illegible]	W	[illegible]	[illegible]
[illegible]	[illegible]	W	[illegible]	[illegible]
[illegible]	[illegible]	W	[illegible]	5/01
[illegible]	[illegible]	U	[illegible]	[illegible]
[illegible]	[illegible]	U,B	[illegible]	[illegible]
Eastern region				
P. H. Glatfelter	Spring Grove, Pa.	U	831	1/16
Lydall/Manning Div.	Green Island, N.Y.	U,B,A,O	128	3/31
Stone Container	York, Pa.	U	192	4/16
Hammermill Paper	Erie, Pa.	U	1,270	6/20
James River	Carthage, N.Y.	U	268	6/30
Hammermill Paper	Oswego, N.Y.	U,B,A,O	137	8/01
Scott Paper	Chester, Pa.	U	1,338	9/27
Garden State Paper	Garfield, N.J.	U	194	9/30
James River	Gouverneur, N.Y.	U	72	11/24
Midwest region				
Kieffer Paper Mills	Brownstown, Ind.	U	62	1/21
Niagara of Wisconsin	Niagara, Wis.	O,U	25,475	1/31
Consolidated Packaging	Fort Madison, Iowa	A	105	4/02
Consolidated Papers				
— Biron Div.	Wisconsin Rapids, Wis.	U,B,A,O	684	4/30
— Kraft Div.	Wisconsin Rapids, Wis.		283	4/30
— Stevens Point Div.	Wisconsin Rapids, Wis.		161	4/30
— Wisconsin Rapids Div.	Wisconsin Rapids, Wis.		1,109	4/30
— Wisconsin River Div.	Wisconsin Rapids, Wis.		468	4/30
Gilbert Paper Company	Menasha, Wis.	U	275	4/30
[illegible] Paper Mills	[illegible], Mich.	U	177	5/06
Scott Paper	Marinette, Wis.	U	818	5/14
	Oconto Falls, Wis.	U	108	5/30
Fox River Paper	Appleton, Wis.	U	174	5/31
James River	Port Huron, Mich.	U	213	6/01
Jefferson Smurfit/CCA	Middletown, Ohio	U	131	6/01
	Lafayette, Ind.	U	60	6/06
Menasha	Otsego, Mich.	U,O	157	6/13
S.D. Warren	Muskegon, Mich.	U	755	6/15
Chicago Paperboard	Chicago, Ill.	U	69	6/19
Appleton Papers	Combined Locks, Wis.	U	[illegible]	6/30
Mosinee Paper	Mosinee, Wis.	U	443	6/30
Stone Container	Coshocton, Ohio	O	217	7/01
	Ontonagon, Mich.	U	214	8/01
[illegible]	[illegible], Ind.	U	40	8/11
French Paper	Niles, Mich.	U	67	8/22
Jefferson Smurfit/CCA	[illegible], Mich.	U	86	9/15
Packaging Corp. of America	Tama, Iowa	U	79	10/01
[illegible] Paper	Terre Haute, Ind.	[illegible]	120	10/21
[illegible]	[illegible], Ohio	U	[illegible]	11/01

Legend: U = United Paperworkers International Union; W = Assn. of Western Pulp & Paper Workers; A = International Assn. of Machinists & [illegible] Workers; B = International Brotherhood of [illegible] Workers; O = [illegible]

[illegible]

Source: American Paper Institute, Employee Relations Dept.

REGULATIONS

SURVIVING IN A "GREEN" DECADE

■ The health of the environment is becoming more important to North Americans, and the paper industry will spend more time and money improving its pollution control processes and, more importantly, explaining to the public what it is doing to improve those processes. Ely Gonick, senior vice president of International Paper Co., noted at Resource Information Systems' (RISI) annual conference last November that the paper industry is "particularly vulnerable to criticism in the environmental arena because it cuts down trees; paper is the largest component of waste in the municipal dumps; the industry uses herbicides and insecticides; and it disposes of byproducts in streams and landfills." Siting a new bleached kraft pulp mill is now a matter for public scrutiny, as Noranda Forest Inc. and Alberta-Pacific Forest Industries Inc. learned in Tasmania and Alberta, respectively, last year.

AIR. The Bush Administration introduced a bill to amend the 1977 Clean Air Act in mid-1988. Congress has been planning to revise the bill since 1987 and may succeed since the current administration says it is more disposed to pass such legislation than the Reagan Administration was. The proposed bill would have the greatest impact on the pulp and paper industry in the areas of acid rain and air toxics.

The acid rain provisions mainly target coal-burning utilities in the Midwest, which will have to reduce emissions of sulfur dioxide. These provisions require mills to add scrubbers or switch to cleaner-burning fuel, both of which will lift the cost of electricity to industry. Industry will be required to monitor air discharges of almost 200 hazardous chemicals and will be subject to fines and criminal penalties. Although the bill has not passed yet and some members of Congress prefer their own amendments to the act, it is clear that in the future industry will be required to spend more money to meet more stringent regulations. Some people estimate the cost of the revision to industry as a whole will come to as much as $20 billion annually.

WATER. North American bleached kraft pulp mills are scrambling to reduce the use of chlorine so they discharge less dioxin in effluent, sludge, and the pulp itself. At the federal level, the Environmental Protection Agency (EPA) has not determined if dioxin needs to be regulated, but some states and regional offices of EPA are writing dioxin limits into effluent discharge permits. EPA is expected to decide by April 1990 if dioxins in effluent need to be regulated. It has placed at least 88 of the 104 bleached kraft pulp mills in the U.S. on the short list under section 304L of the Clean Water Act (*P&P*, September 1989, p. 105), meaning that mills will have to meet limits on dioxin in their effluent by June 4, 1992. Some of these limits are as low as 0.4 parts per quadrillion, but current technology is not sensitive enough to test these levels.

Separately, Canadian provinces have announced limits on dioxin and have mandated process changes. For example, the 17 bleached kraft pulp mills in British Columbia will be required to install secondary treatment systems by 1994 at an estimated combined cost of C$800 million and to limit discharges of chlorinated organic compounds to 1.5 kg/metric ton of pulp by 1994. The province of Alberta requires all bleached kraft pulp mills to use extended delignification and install oxygen delignification systems. Both Canadian and U.S. pulp mills are chasing after chlorine dioxide generators—order backlogs are said to be about 18 months.

It is likely that by April 1990 EPA will decide to regulate dioxin. If nothing else, federal regulation will clarify some of the legal questions of why some regions and states are imposing regulations and others aren't. Expenditures on dioxin control vary from one mill to the next depending on the age of the mill and the kinds of processes it uses. However, RISI estimates an average mill will spend $50 million to control dioxin discharges. There are 151 bleached kraft pulp mills in North America, bringing the expenditure to a whopping $7.5 billion. Unless a mill manages to wrangle permission for a simultaneous capacity expansion, these expenditures will not be offset by savings in operating costs.

SOLID WASTE. It is becoming difficult for mills to get permits to landfill mill sludge—the preferred way of disposal by about 75% of U.S. mills. So far industry has been exempt from the stricter regulations applied to municipal solid waste sites, but EPA is expected to make industrial landfills meet stricter criteria through Subtitle D of the Resource Conservation & Recovery Act. EPA is expected to finalize the industrial nonhazardous solid waste regulations in late 1990 or early 1991. Individual states will have to adopt their own equivalent guidelines 18 months later, retaining permitting and enforcement authority. Mills in some states, such as Wisconsin, will have stricter standards imposed sooner while other states will wait until final federal guidelines are imposed (*P&P*, September 1989, p. 200.)

In terms of long-term profitability, industry executives are more concerned about the effects of state and federal laws mandating recycled fiber use and taxes on virgin fiber than the dioxin issue. Hearings are expected to begin this month on a federal bill that would put an initial 3% tax on profits from paper products that don't comply with EPA's federal recycled paper procurement standards. Other bills that target only newsprint will also be taken up this year. EPA's avowed desire to reduce the source of solid waste in landfills (paper makes up about 40% by weight of municipal solid waste) means people will be urged to consume less paper. This will directly harm paper companies' bottom line.

Ironically, some paper mills are having trouble getting permits to site recycled paper mills because these mills generate sludge that needs to be landfilled.

PULPWOOD

HIGH PRICES IN WEST; SHORTAGES IN SOUTH

■ Last year witnessed the collapse of the timber sale system from federal lands in the Pacific Northwest, and the effects of resulting aberrations in the woodchip market will spill over into 1990. Preservationists were successful in getting injunctions on about 2 billion bd ft of timber sales in the Northwest, leaving sawmills without their usual supply of logs (*P&P*, Aug. 1989, p. 98). The shortage was compounded by very strong log exports to Japan in the first half. Fortunately, the weather remained good in summer 1989, and logging wasn't curtailed because of fire danger.

Because of uncertainty over the federal timber sale program and because Congress did not decide until last October on the annual allowable cut for fiscal 1990, pulp mills in the Northwest began to stockpile chips. Inventories were built up to such a degree that most woodyard managers felt confident about meeting all contingencies in the fourth quarter.

If this winter is harsher than usual, these inventories will disappear rapidly. On the other hand, demand may come off as the industry enters a down cycle. Also, demand for wood from the San Francisco Bay Area will be high as that region rebuilds from its Oct. 17, 1989, earthquake, meaning more chips will be generated by sawmills in the Northwest. Housing starts last year fell to about 1.35 million compared with about 1.48 million in 1988. Starts for 1990 are forecast at 1.44 million since interest rates may ease, putting more chips on the market.

In November 1989, Senator Robert Packwood (R-Ore.) introduced two pieces of legislation that will probably be voted out of committee in the first half of this year. One bill would make permanent the ban on exporting logs cut on federal land. The second bill would allow states to restrict exports of logs from state-owned land. These laws are designed to make more logs available for U.S. sawmills, but some observers feel the restrictions would do little to bolster domestic supply since most of the log exports going to Japan are second-growth timber and the domestic sawmills facing permanent closure can process only old-growth logs.

Domestic chip prices in the region track the export price of chips going to Japan. During second-half 1989, Douglas fir chips moving from the West Coast to Japan were selling for $133/bdu f.o.b. vessel, an increase of $46.30/bdu from second-half 1988. The Japanese are said to be seeking significant reductions in the price for first-half 1990. They were turning away shipments of red alder last fall and were staying out of the market as much as possible since they have rebuilt inventories. Chip prices in the region are forecast to decline in the first half compared with second-half 1989, but in the long term, wood costs for mills in the Northwest will trend higher since most of the old growth that can be logged has been logged and second-growth stands don't yield as much wood per acre. The U.S. Forest Service indicated it will put less federal timber up for sale in the future. Also, some segments of the citizenry in British Columbia are opposed to clear-cutting, so fewer chips will be available for shipment to mills in Washington.

In contrast, chip prices in the South are expected to increase in first-half 1990, particularly for hardwood. Even before Hurricane Hugo hit South Carolina last fall, heavy rains in May and June from Hurricane Alison curtailed logging in the Gulf Coast states of Texas, Louisiana, Mississippi, and Florida. Hardwood is scarcer than pine, partly because it grows in creek bottoms and lowlands more susceptible to flooding. Pulp mills were forced to run more pine in their mix than they would like. The Japanese have also been competing for hardwood. The wet weather made it impossible for woodyard managers in some areas to build winter supplies, which will cause higher chip prices in the first part of this year, particularly in South Carolina and Georgia.

The South Carolina Forestry Commission estimates that one-third of the forestland in the state was damaged by Hurricane Hugo—4.4 million acres or 6.7 billion bd ft of timber. About 1.3 million acres of land need to be reforested. But of most concern is the fact that 16 years' worth of hardwood consumption was destroyed. Observers expect chip prices and stumpage values, particularly for hardwood, to escalate this spring because of reduced supply and increased demand from mills in the region that are expanding their hardwood requirements. For example, Willamette Industries Inc.'s greenfield uncoated free-sheet mill will start up in South Carolina this year and is expected to use about 60% hardwood in its furnish. Union Camp Corp., Eastover, S.C., and Stone Container Corp., Port Wentworth, Ga., both have expansions under way that will require more hardwood.

TABLE 6: **Timber damaged by Hurricane Hugo.**

	Acres damaged	Acres needing reforesting
Nonindustrial private landowners	[illegible]	[illegible]
Forest industry owned lands	[illegible]	[illegible]
Other corporate owned lands	[illegible]	[illegible]
State owned lands	[illegible]	[illegible]
Federally owned lands	[illegible]	[illegible]
Total	[illegible]	[illegible]

Source: South Carolina Forestry Commission.

ISSUE FOCUS: **CAPITAL SPENDING**

CAPITAL SPENDING SURVEY: 1989-91

U.S. and Canadian pulp and paper companies stick to record capital spending plans despite evidence of an industry slowdown

By CARL ESPE, News Editor

Capital spending continues to boom in both the U.S. and Canada, despite increasing evidence that the economy is slowing and that the industry faces a cyclical slowdown. In *Pulp & Paper*'s annual end-of-year survey of capital investment, U.S. mills reported plans to spend $18.01 billion on expansion and modernization projects over the 1989-91+ period, an increase of 32% over plans reported a year ago for 1988-90. Proposed projects—under active consideration but with no firm startup date—add another $5.80 billion to spending plans.

The picture is just as dramatic in Canada, where mills report plans to spend C$12.87 billion on improvements over the 1989-91+ period, up 29% from a year ago. In the "proposed" category, another C$4.32 billion worth of projects are under active consideration.

Capacity expansion remains the driving force behind current spending plans. Spending for new paper machines is estimated at $5.14 billion for the U.S. and C$2.47 billion for Canada. Spending for new mills with firm startup dates totals $3.29 billion in the U.S. and C$3.22 billion in Canada.

Newsprint took the spotlight last year, especially in Canada, but the most active grades now are recycled paper and paperboard. Recent legislation promoting wastepaper use has led to a flurry of expansion proposals over the past few months, several of which have been approved for startup in 1992 and beyond. Capacity growth is also strong for containerboard, bleached paperboard, uncoated free-sheet, coated free-sheet, and tissue.

High market pulp prices have led to an increase in pulping projects, both to expand tonnage for internal use and for sale. Pulp mill improvements account for 36% of production-related outlays this year in both the U.S. and Canada. Expansion projects have been linked in many cases to necessary environmental improvements to lower total reduced sulfur (TRS) emissions, comply with stricter odor regulations, and reduce dioxin formation. As a result, a number of bleached kraft mills are undergoing sweeping modernization programs.

A SHARP DROP IN 1991? A recent Data Resources Inc. survey, conducted last fall, reported that the U.S. paper industry plans to spend $18.10 billion on capital projects in 1990, an increase of 14.2% over estimated spending of $15.85 billion in 1989. A 14% increase would be a marked drop from the 40% gain posted in 1989 but still a very strong performance. DRI reports that paper companies plan to trim spending in 1991 to $9.89 billion, however, a precipitous drop of 45% from the 1990 forecast.

Overall, manufacturers reported plans to increase spending 6.4% in 1990, following a 10% increase in 1989. Manufacturers plan to trim 1991 spending 2.7%.

P&P's investment survey confirms the DRI results for 1990 but paints a less pessimistic picture for 1991. In the U.S., projects scheduled for startup in 1989 account for $3.70 billion of total planned spending, 1990 startups for $6.44 billion, and 1991 startups for $4.81 billion. Spending for projects targeted for startup in 1992 and beyond amounts to $3.06 billion. In percentage terms, 36% of reported outlays are for 1990 projects, 27% for 1991, and 17% for 1992 and beyond. This pattern suggests that spending will definitely remain high this year, despite the fact that markets have cooled off. Several very large expansion programs have been announced over the past several months for startup in 1991 and beyond, and producers appear committed to strong spending programs.

CANADIAN OUTLOOK. The situation is similar in Canada, where 1989 startups account for C$3.18 billion of total outlays, 1990 startups for C$4.65 billion, and 1991 projects for $1.47 billion. Spending for 1992 startups totals $3.24 billion, but only $315 million worth of projects have been announced for startup in 1993 and beyond. In percentage terms, 36% of total outlays will go for projects started up this year, 11% in 1991, and 25% in 1992. As in the U.S., the high percentage of startups planned for this year should assure another year of record spending. The outlook for 1991 and beyond is

*Complete results of P&P's exclusive survey of North American capital spending programs for 1989-91 are available in a separate **Mill-by-Mill Listings** report. Organized by company, the listings show programs for new mills and machines, rebuilds and modernizations, environmental quality control, and other mill improvements, with specifics on equipment ordered, dates, suppliers, and prices, where available. Subscribers to P&P's monthly newsletter, Project Report, receive a free copy of the report with their January issue. All others may obtain a copy of the report for US$145. To order, send payment to Pulp & Paper, Editorial Dept., 500 Howard St., San Francisco, Calif. 94105.*

weaker, however, with a much lower percentage of projects under way for startup in 1991. Spending plans for 1992 remain strong at present, but a sharp downturn this year or next could easily cause postponements or cancellations since few of these projects are under way.

Canadian companies face problems with newsprint oversupply and weakness in other paper grades, a stronger Canadian dollar, and higher wood costs on the West Coast. Third-quarter profits for the Canadian industry were down 37.4% from a year earlier, according to a recent *Pulp & Paper Week* survey. On the other side of the equation, companies have enjoyed strong cash flows for the past two years, allowing them to reduce debt loads and to pursue necessary improvements and expand capacity despite weaker markets.

ABOUT *P&P'S* ANNUAL SURVEY. Now in its twenty-sixth year, *P&P*'s annual capital spending survey covers expansion and modernization programs at U.S. and Canadian mills. Unlike surveys that track spending by year, *P&P*'s survey covers spending by project. Dollar figures represent the total cost of reported projects and often include supporting equipment. The total cost of multiyear projects is assigned to the startup year and is not divided among the years of expenditure. Each survey primarily covers a three-year period—the current survey covers 1989-91—but projects with firm startup dates beyond that time frame are also included. ■

UNITED STATES

EXPANSION-MINDED COMPANIES LEAD OFF THE DECADE WITH RECORD SPENDING PLANS

■ Ambitious capacity expansion plans will buoy record capital spending plans at U.S. pulp and paper mills this year. Prices and profits may be down, but you won't see it reflected in this year's capital spending plans—at least not yet.

Spending totals $18.01 billion for the 1989-91+ period in *P&P*'s latest survey, up 31.6% from last year. This follows an increase of over 70% in 1988, when mills reported plans to spend $13.7 billion on 1988-90 projects. Spending on projects for startup in 1989 was about 15% higher than expected a year ago, while spending committed for 1990 startups is up 29%.

Spending for production-related improvements totals $16.76 billion for 1989-91, an increase of 28.9% over last year. The largest percentage gains are for pulp mill improvements and for new paper machine installations, up 39.2% and 38.1%, respectively. Spending for paper machine rebuilds is up a more modest 13.0% over last year's survey, while woodyard spending climbed 7.1%. Energy improvements continue to lag other types of investment, reflecting lower fuel and electricity prices.

U.S.—REPORTED CAPITAL EXPENDITURES FOR 1989-91+ BY REGION AND TYPE OF FACILITY ($000)

PRODUCTION-RELATED EXPENDITURES

	WOOD/FIBER		PULPING		NEW MACHINES		REBUILDS		ENERGY		PLANT	
New England	25,000	5%	345,200	5%	580,000	11%	307,100	13%	273,500	20%	136,600	13%
Mid-Atlantic	0	0%	37,650	1%	0	0%	103,056	4%	114,521	8%	100	0%
East North Central	28,800	6%	328,010	5%	886,350	17%	380,951	16%	172,540	13%	177,830	17%
West North Central	71,000	14%	318,865	5%	493,455	10%	66,300	3%	8,976	1%	80,854	8%
South Atlantic	92,875	18%	2,121,680	33%	1,478,113	29%	681,130	29%	274,200	20%	213,433	21%
East South Central	233,796	46%	1,866,051	29%	539,070	10%	332,600	14%	372,686	27%	284,462	28%
West South Central	40,300	8%	253,350	4%	645,900	13%	319,200	14%	42,500	3%	69,750	7%
Mountain/Pacific	15,300	3%	1,107,303	17%	512,750	10%	169,400	7%	101,300	7%	59,755	6%
Total	**507,071**		**6,378,109**		**5,135,638**		**2,359,737**		**1,360,223**		**1,022,784**	

ENVIRONMENTAL QUALITY SPENDING

	WATER		AIR		SOLID WASTE		PRODUCTION		ENVIRONMENT		TOTAL	
New England	0	0%	5,750	1%	9,400	16%	1,667,400	10%	15,150	1%	1,682,550	9%
Mid-Atlantic	2,178	0%	7,500	1%	1,950	3%	255,327	2%	11,628	1%	266,955	1%
East North Central	9,980	1%	15,278	3%	6,095	10%	1,974,481	12%	31,353	3%	2,005,834	11%
West North Central	4,752	1%	4,752	1%	396	1%	1,039,450	6%	9,900	1%	1,049,350	6%
South Atlantic	206,382	30%	141,212	28%	7,436	13%	4,861,431	29%	355,030	28%	5,216,461	29%
East South Central	266,382	39%	209,818	42%	18,290	31%	3,628,665	22%	494,490	40%	4,123,155	23%
West South Central	25,160	4%	25,165	5%	5,375	9%	1,371,000	8%	55,700	4%	1,426,700	8%
Mountain/Pacific	170,755	25%	92,275	18%	10,000	17%	1,965,808	12%	273,030	22%	2,238,838	12%
Total	**685,589**		**501,750**		**58,942**		**16,763,562**		**1,246,281**		**18,009,843**	

States are assigned to regions as follows:
New England: Maine, Vt., N.H., Conn., R.I., Mass.
Mid-Atlantic: N.Y., N.J., Pa.
East North Central: Wis., Mich., Ill., Ind., Ohio
West North Central: N.Dak., S.Dak., Nebr., Kans., Minn., Iowa, Mo.
South Atlantic: Del., Md., W.Va., Va., N.C., S.C., Ga., Fla.
East South Central: Ky., Tenn., Miss., Ala.
West South Central: Okla., Texas, Ark., La.
Mountain/Pacific: Wash., Ore., Calif., Alaska, Idaho, Nev., Mont., Wyo., Utah, Ariz., Colo., N.Mex.

Power plant outlays are up 0.5% to $1.36 billion for 1989-90.

Spending for environmental improvements jumped to $1.25 billion in this year's survey, an increase of 83.2% over last year. Three years of increases have pushed environmental spending to its highest level since the 1970s. Higher spending for environmental programs will be necessary over the next several years to comply with more stringent regulation of both water and air pollution. Current spending plans for environmental improvements make up 6.9% of total outlays, up from 5% last year—still well shy of the spending levels of the early 1970s.

Reflecting widespread moves to combat dioxin formation, water quality spending is the highest priority in current environmental spending plans. The total reported for 1989-91 is $686 million, up 63.3% from last year. Spending for air improvements totals $502 million, an increase of 130.8%. Outlays to handle solid waste total $59 million in this year's survey, up 37.6% after a drop of 19% last year.

Faced with a solid waste problem that threatens to grow to crisis proportions, more than a dozen states are considering or have already passed laws mandating increased use of recycled fiber in newsprint and other paper grades. This situation has led to a boom in secondary fiber expansion projects and proposals, as papermakers scramble to position themselves for what promises to be a very different market.

PULPING IMPROVEMENTS LEAD SPENDING. Pulp mill expansion and modernization projects capture the largest share of spending in this year's survey. Mills report plans to spend $6.38 billion on pulping projects during the 1989-91 period, or 38.0% of total production-related spending. Pulp mill spending accounted for 35% of total outlays in last year's survey and 24% the year before.

Capacity expansion, environmental upgrading, and cost reduction are the three most important factors in current pulp mill spending plans. Mills are expanding both market pulp capacity and captive pulp capacity to support more paper and paperboard production. Environmental improvements center on odor control and on reducing chlorine use to limit dioxin formation.

High prices and tight markets have made market pulp capacity expansion the driving force behind pulp mill spending. Several of these projects are at mills that did not previously produce market pulp.

Four major projects scheduled for completion this year will add almost 500,000 tpy of bleached kraft market pulp capacity at a cost of over $800 million. In the largest, Weyerhaeuser Co. will start up a new 358,000-tpy mill at its Columbus, Miss., facility at a cost of $500 million. Bowater Inc. is building a complete new bleached kraft pulp mill at Calhoun, Tenn., at a cost of $205 million. The other two projects will improve existing facilities at James River Corp., Camas, Wash., and Louisiana-Pacific Corp., Samoa, Calif.

In 1991, Parsons & Whittemore Inc. will complete construction of a new $700-million bleached softwood kraft market pulp mill at Claiborne, Ala. The Alabama-Pine Co. mill will have capacity for 1,250 metric tpd. Stone Container Corp.'s Port Wentworth, Ga., mill will start up a new 740-tpd bleached hardwood kraft market pulp mill as part of a $335-million modernization, and

U.S. GREENFIELD MILL PROJECTS

STARTED UP IN 1989

FSC Paper, Alsip, Ill.
80,000-tpy recycled tissue; Sulzer Escher Wyss paper machine
Newsprint South, Grenada, Miss.
225,000-tpy TMP/newsprint; Beloit paper machine
Ponderay Newsprint, Usk, Wash.
180,000-metric-tpy TMP/newsprint; Valmet paper machine

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Alabama River Newsprint, Claiborne, Ala. **1990**
242,500-metric-tpy TMP/newsprint; Valmet paper machine
Kimberly-Clark, Jenks, Okla. **1990**
68,000-tpy tissue; one paper machine
Kimberly-Clark, Loudon, Tenn. **1990**
C & I tissue; about half the size of Jenks mill
Mead, Mahrt, Ala. **1990**
350,000-tpy coated natural kraft paperboard; Valmet paper machine
Mi Ho Paper, St. Joseph, Mo. **1990**
Recycled coated and uncoated fine paper mill
Willamette Industries, Bennetsville, S.C. **1990**
200,000-tpy uncoated free-sheet; Valmet paper machine
Kenaf of North America, Muskogee, Okla. **1991**
750-tpd recycled containerboard mill; Tampella machine
Parsons & Whittemore, Claiborne, Ala. **1991**
1,250-metric-tpd bleached softwood kraft market pulp
Daishowa/Trans-Rim, Stockton, Calif. **1992**
350,000-tpy recycled containerboard mill
Inland Container, Maysville, Ky. **1993**
600-tpd recycled containerboard mill

PROPOSED (NO STARTUP DATE)

Dunkirk Paperboard, Dunkirk, N.Y.
250,000-tpy recycled containerboard mill
Evco, San Augustine, Texas
500-metric-tpd market CTMP mill
Garden State Paper, Northeast U.S.
Studying recycled newsprint mill for northeast U.S.
Great Northern/MD Papier, Millinocket, Maine
760-tpd lightweight coated paper, 1992 target
Northampton Paperboard, Northampton, Pa.
500- to 600-tpd recycled linerboard; preliminary study stage
Scott Paper, undecided location
Tissue mill with converting lines
Smurfit Newsprint, Northeast U.S.
250,000-tpy recycled newsprint mill; 1993 target
Westbrook Wood Products, Medford, Ore.
Publication papers mill
WTD Industries, Port Westward, Ore.
300,000-tpy market bleached softwood kraft pulp

Union Camp Corp. will complete a 105,000-tpy market pulp facility in its $675-million expansion program at Eastover, S.C. Potlatch Corp. plans a new oxygen delignification system and single pulp line to add 45,000 tpy to bleached kraft pulp capacity at Lewiston, Idaho, at a cost of $105 million.

A four-year, $408-million modernization at Champion International Corp.'s Courtland, Ala., mill for completion in 1993 includes 250,000 tpy of new bleached kraft pulp capacity.

Plans for new pulp mills in Oregon face environmental challenges that have delayed one project and possibly killed another. WTD Industries Inc.'s permit application for a 300,000-tpy, $420-million bleached softwood kraft market pulp mill to be built at Port Westward, Ore., was denied this fall, throwing the project into limbo. Pope & Talbot Inc.'s proposed $350-million expansion at Halsey, Ore., is still in the permitting process and has been pushed back from its original 1991 target date to 1992.

Large-scale pulp expansion programs are also under way at integrated mills expanding capacity for printing and writing grades, kraft linerboard, and bleached paperboard. Nekoosa Papers Inc. installed a new $90-million recovery boiler last year in support of an uncoated free-sheet expansion due for completion in 1991. This year, Boise Cascade Corp. will complete kraft pulp expansions at two mills: Rumford, Maine, and International Falls, Minn.

Union Camp's $375-million restructuring program at the Savannah, Ga., kraft linerboard mill, set for completion in early 1991, includes extensive pulp mill modernization work. Gaylord Container Corp. is another linerboard producer spending heavily to modernize pulp facilities, both at Bogalusa, La., and Antioch, Calif. Nekoosa Packaging Corp. has approved a major upgrade program for its Valdosta, Ga., kraft linerboard mill that focuses on pulp improvements.

A major bleached paperboard expansion at Westvaco Corp.'s Covington, Va., mill includes a new $130-million recovery boiler and more kraft pulp capacity. Startup is set for 1991. Federal Paper Board Co. Inc. will complete another large increase in pulp capacity to support a bleached paperboard expansion targeted for completion in 1992. Just last month, Gulf States Paper Corp. announced a $250-million plan to double pulping capacity at its Demopolis, Ala., mill in anticipation of a bleached paperboard expansion later in the decade. The pulp expansion project will be completed within four years.

Spending for paper machine modifications and improvements is up 13.0% from last year's survey, reflecting a continuing boom in capacity expansion projects. Spending for rebuild projects totals $2.36 billion for the 1989-91 period.

Rebuilds will continue to contribute the most to new capacity in the containerboard sector, where few new paper machines are scheduled. Wide-nip press installations have allowed linerboard and corrugating medium producers to raise capacity for far less than the cost of new machines. Containerboard mills with extensive machine modernization programs under way include Gaylord Container, Antioch, Calif.; Green Bay Packaging Corp. at Green Bay, Wis., and Morrilton, Ark.; MacMillan Bloedel Inc., Pine Hill, Ala.; and Jefferson Smurfit Corp., Jacksonville, Fla. International Paper Co. modernized its Vicksburg, Miss., machine in 1989 and is considering similar projects for Pineville, La., and Gardiner, Ore.

Among bleached paperboard mills, Federal Paper Board at Augusta, Ga., and International Paper at Pine Bluff, Ark., and Texarkana, Texas, have major modernization and expansion programs under way. In the coated paper sector, Boise Cascade at Rumford, Maine, and Scott Paper Co.'s S.D. Warren Div. at Muskegon, Mich., are adding coated free-sheet capacity through machine rebuilds. Additional large-scale printing and writing paper machine improvement programs are under way at Champion, Courtland, Ala.; Westvaco, Luke, Md.; and Fraser Inc., Madawaska, Maine.

U.S. mills report plans to spend $1.36 billion on power plant improvements during the 1989-91 period, an increase of just 0.5% over last year's plans. Energy projects have slipped to an 8.1% share of production-related spending, down from 10% last year and 17% the year before. Thanks largely to lower energy prices, mills have been able to shift their spending priorities to other areas of the mill. Power plant outlays have declined steadily since the early years of the decade as a percentage of total mill spending.

The number of new power boilers currently planned at U.S. mills is down sharply from past years. Some 15 new power boilers have been approved for the 1989-91 period. That compares with over 25 installations in the 1987-89 period and 40 or more during 1985-87. In contrast to the cutback in new power boilers, the number of new recovery boilers approved recently has risen sharply, as mills gear up for a major wave of kraft pulp expansion.

NEW MILLS AND MACHINES. New paper machines account for 30.6% of total production spending in this year's survey, up from 28.6% last year. Planned spending for 1989-91 totals $5.14 billion, up 38.1% from last year.

New paper machine announcements have climbed dramatically over the past two years. Twenty-three new paper machines and another 12 machines at new mills are scheduled for startup during the 1989-92 period. The total number in last year's survey was 28 machines. The most active grades for new machines are tissue, coated and uncoated free-sheet paper, newsprint, kraft paperboard, and recycled paperboard.

Thirteen new paper machines are scheduled to come online this year, seven at existing mills and six at greenfield facilities. Mead Corp. is building a new $556-million coated natural kraft paperboard mill at Phenix City, Ala. Gaylord Container will start up a new 1,000-tpd linerboard machine at Bogalusa, La., the first new linerboard unit to be built since 1985. Union Camp's $375-million modernization and expansion at Savannah, Ga., will replace two older units with a new kraft linerboard machine in 1991, and Jefferson Smurfit plans a new linerboard machine for its Fernandina Beach, Fla., mill.

In uncoated free-sheet, Willamette Industries Inc. is building a greenfield mill at Bennetsville, S.C., for startup in 1990, and Boise Cascade has undertaken an extensive $525-million modernization and expansion program at International Falls, Minn. Union Camp will complete a $700-million expansion in 1991 that includes a new paper machine at its Eastover, S.C., mill. Also in 1991, Nekoosa Papers will complete a $500-million expansion at Ashdown, Ark., adding 325,000 tpy.

Champion International is installing a new coated free-sheet unit at its Quinnesec, Mich., market pulp mill this year, and Scott Paper's S.D. Warren Div. is building another lightweight coated free-sheet unit at Skowhegan, Maine. In 1991, Consolidated Papers will complete installation of a new $400-million coated free-sheet machine at the Wisconsin Rapids Div. Most recently, Boise Cascade announced plans for a $450-million coated groundwood expansion at Rumford, Maine, targeted for completion in late 1993.

This year, Alabama River Newsprint Co., a joint venture of Abitibi-Price Inc. and Parsons & Whittemore, will bring online a newsprint mill at Claiborne, Ala., at a cost of $320 million. North Pacific Paper Corp. has approved a new recycled newsprint machine to be installed at Longview, Wash., along with new deinking facilities and pulp improvements. The $300-million program is scheduled for completion in 1991.

Chesapeake Corp.'s Wisconsin Tissue Mills facility in Menasha, Wis., will start up a new recycled tissue mill this year, and Kimberly-Clark is building two new tissue mills this year, at Jenks, Okla., and Loudon, Tenn. Fort Howard Corp. plans to install a fourth recycled tissue machine at Rincon, Ga., in 1991.

A new recycled containerboard machine is scheduled for startup in each of the next three years. Due first in 1991 is Kenaf of North America Inc.'s $130-million, 750-tpd mill in Muskogee, Okla. Daishowa America Inc. and Trans-Rim Enterprises Ltd. will build a $200-million, 350,000-tpy facility in Stockton, Calif., for startup in 1992. Finally, Inland Container Corp. has announced a new $160-million mill for Maysville, Ky., with capacity for 600 tpd.

The bleached board sector is scheduled to get two new machines in 1992. Federal Paper Board's Augusta, Ga., mill is installing a $375-million, 650-tpd unit, and Westvaco is expanding at Covington, Va., at a cost of $400 million. ■

NEW PAPER MACHINES IN U.S. AT EXISTING MILL SITES

STARTED UP IN 1989

Blandin Paper, Grand Rapids, Minn. 1989
254,000-tpy, 306-in.-trim machine, replacing one—LWC
Fort Howard, Green Bay, Wis.
Fourth recycled tissue machine
Fort Howard, Rincon, Ga.
250-tpd, 270-in. Beloit—tissue
Hollingsworth & Voss, Hawkinsville, Ga. 1989
Specialty industrial paper machine—auto filter paper
Kimberly-Clark, Whiting, Wis. 1989
30,000-tpy machine—premium correspondance and specialty paper
Southeast Paper Manufacturing, Dublin, Ga. 1989
210,000-tpy, 330-in.-trim Valmet—newsprint

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Boise Cascade, International Falls, Minn. 1990
300,000-tpy, 348-in.-trim Valmet—uncoated free-sheet
Champion International, Quinnesec, Mich. 1990
265,000-tpy, 280-in.-trim Beloit—coated free-sheet
Chesapeake, Menasha, Wis. 1990
80,000-tpy Beloit twin-wire—recycled tissue
Consolidated Papers, Stevens Point, Wis. 1990
59,000-tpy, 180-in. yankee fourdrinier—specialty coated
Gaylord Container, Bogalusa, La. 1990
1,000-tpd machine—kraft linerboard
Longview Fibre, Longview, Wash. 1990
240-in.-trim, 3,000-fpm Beloit—kraft paper
Scott Paper, Skowhegan, Maine 1990
Lightweight coated free-sheet machine
Consolidated Papers, Wisconsin Rapids, Wis. 1991
212,000-tpy, 285-in. fourdrinier—coated free-sheet
Fort Howard, Rincon, Ga. 1991
250-tpd, 270-in. Beloit—tissue
Great Northern Nekoosa, Ashdown, Ark. 1991
210,000-tpy No. 64 machine—uncoated free-sheet
Union Camp, Eastover, S.C. 1991
240,000-tpy No. 2 machine—uncoated free-sheet
Union Camp, Savannah, Ga. 1991
460,000-tpy, 363-in. Valmet, replacing two-kraft linerboard
Weyerhaeuser/North Pacific, Longview, Wash. 1991
230,000-metric-tpy machine—recycled newsprint
Federal Paper Board, Augusta, Ga. 1992
650-tpd machine-bleached paperboard (bristols)
Jefferson Smurfit, Fernandina Beach, Fla. 1992
New linerboard machine
Westvaco, Covington, Va. 1992
350,000-tpy machine-bleached paperboard
Boise Cascade, Rumford, Maine 1993
318,000-tpy, 325-in. machine—LWC

PROPOSED (NO STARTUP DATE)

Cascades/Steinbeis, Niagara Falls, N.Y.
100,000-metric-tpy recycled computer printout paper
Daishowa America, Port Angeles, Wash.
Studying two machines, one 220,000-tpy newsprint and one 150,000-tpy directory—delayed
Fort Howard, Muskogee, Okla.
New recycled tissue machines under study
Fraser Paper, Madawaska, Maine
Studying new lightweight coated paper machine
Golden State, Pomona, Calif.
230,000-tpy machine—recycled newsprint
Gulf States, Demopolis, Ala.
Bleached paperboard machine; mid-1990s target
James River, St. Francisville, La.
Considering new coated printing paper machine
Madison Paper, Madison, Maine
[illegible]-tpy supercalendered paper; target [illegible]
[illegible]
[illegible]

CANADA

MARKET PULP EXPANSION, ENVIRONMENTAL PROGRAMS LEAD RECORD SPENDING DRIVE

■ Canadian capital spending is up 29.3% in this year's survey of 1989-91 investment plans, following a 49.0% increase last year. Companies report plans to spend C$12.87 billion on capital projects during the 1989-91 period, up from $9.95 billion reported last year for 1988-90. The ongoing expansion boom and a big boost in environmental spending are most responsible for the increase, which comes despite a deterioration in profits from weak newsprint markets, rising costs, and the strong Canadian dollar.

Strong capacity growth in Canada will continue into the early 1990s, according to the 1988-91 Canadian Pulp & Paper Assn. capacity survey. Total Canadian paper and paperboard capacity will climb from 17.0 million metric tons in 1988 to 20.3 million tons in 1991, an increase of 19.2%. Total pulp capacity will climb 13.5% over the same period, from 25.0 million tons in 1988 to 28.4 million tons in 1991. Market pulp capacity, which accounts for about a third of total pulp capacity, will rise 12.5%, from 8.4 million tons in 1988 to 9.5 million tons in 1991.

Growth will be over three times as strong for the 1989-91 period as for the preceding ten years in all three categories: paper and board, total pulp, and market pulp. Growth will average 5.9% a year for paper and board, compared with 1.8% over the 1979-88 period. Market pulp growth will average 4.0% annually through 1991, up from 1.33% a year over the past ten years.

While virgin newsprint will suffer from overcapacity over the next couple of years, a shortage of recycled newsprint could occur because of legislation in the U.S. promoting its use. Many North American newsprint producers that are not using any secondary fiber now are seriously considering some type of expansion into recycled newsprint. Canadian producers are in a particularly tight spot because they are building most of the virgin-pulp newsprint capacity currently under construction, and they are poorly situated geographically to increase usage of recycled fiber.

In eastern Canada, Abitibi-Price Inc., Bowater Mersey Paper Co., Daishowa Forest Products Ltd., Donohue Inc., and Kruger Inc. are all studying plans to incorporate secondary fiber in their newsprint operations. Last year, Donohue opted for a thermomechanical pulp (TMP) expansion scheduled for completion this year after first considering construction of a new 50,000-tpy deinking facility. Now, the original plan to add deinking capacity is being reconsidered. In November, Noranda Forest Inc. announced the formation of Noranda Forest Recycled Papers to concentrate its recycling efforts into one company. Centered around the Thorold, Ont., mill formerly belonging to Fraser Inc., the new division is planning what it says will be the world's largest recycled printing and writing paper facility, with capacity for 115,000 tpy.

In western Canada, a new California recycling law has prompted Fletcher Challenge Canada Ltd. and MacMillan Bloedel Ltd. to announce plans for deinking facilities. Both companies are considering projects in the $60- to $90-million range. MB ships about 225,000 tpy of newsprint to California, or 39% of the output from its

CANADA—REPORTED CAPITAL EXPENDITURES FOR 1988-90+ BY REGION AND TYPE OF FACILITY (C$000)

PRODUCTION-RELATED EXPENDITURES

	WOOD/FIBER		PULPING		NEW MACHINES		REBUILDS		ENERGY		PLANT	
Maritimes	32,961	6%	355,047	6%	370,000	15%	669,000	77%	30,000	4%	48,350	10%
Quebec	38,035	7%	1,229,114	22%	1,075,000	44%	270,488	28%	112,016	15%	93,968	20%
Ontario	25,088	5%	702,138	12%	420,000	17%	304,124	31%	138,724	19%	76,000	16%
Central	100,000	18%	200,000	4%	0	0%	0	0%	0	0%	23,250	5%
West	350,318	64%	3,154,378	56%	601,596	24%	332,000	234%	446,507	61%	220,474	48%
Total	**546,382**		**5,640,677**		**2,466,596**		**973,512**		**727,247**		**462,222**	

ENVIRONMENTAL QUALITY SPENDING

	WATER		AIR		SOLID WASTE		PRODUCTION		ENVIRONMENT¹		TOTAL	
Maritimes	4,250	0%	11,750	3%	3,500	5%	903,438	8%	19,500	1%	922,938	7%
Quebec	125,700	8%	53,719	14%	37,656	54%	2,818,621	26%	217,075	11%	3,035,696	24%
Ontario	155,498	10%	5,010	1%	1,328	2%	1,686,054	15%	161,836	8%	1,827,890	14%
Central	0	0%	0	0%	0	0%	323,250	3%	0	0%	323,250	3%
West	1,306,853	82%	315,916	82%	27,398	39%	5,106,272	47%	1,650,167	81%	6,755,439	53%
Total	**1,592,301**		**386,395**		**69,882**		**10,836,635**		**2,048,578**		**12,865,213**	

[1] Includes [illegible]

[illegible]

two British Columbia mills. Fletcher Challenge's shipments to California total about 300,000 tpy, or 26% of its British Columbia output. Another proposal was announced late last year by Newstech Recycling for a new $80-million, 122,500-tpy market deinked groundwood pulp mill to be built in the Vancouver, B.C., area.

FOREIGN INVESTMENT A BIG FACTOR. Much more than in the U.S., capital spending is getting a boost in Canada from overseas investment, especially from Japan. Crestbrook Forest Industries Inc., majority owned by Honshu Paper Co. and Mitsubishi Corp. of Japan, is pursuing plans to build the largest single-line pulp mill in the world in the Athabasca-Lac La Biche region of Alberta. The 496,000-metric-tpy bleached hardwood kraft market pulp mill, Alberta-Pacific Forest Industries Inc., was originally targeted for late 1991, but the project has run into stiff opposition in the permitting process because of environmental concerns. The C$1-billion project is now targeted for completion in 1992.

Daishowa of Japan is building a greenfield market bleached kraft mill in Peace River, Alta, for startup in 199[illegible]. The $500-million mill will produce 340,000 tpy. In addition, Oji Paper of Japan has entered into a joint venture with Canfor Corp. to boost market pulp capacity [illegible],000 tpy this year at the Howe Sound Pulp & Paper Co., Ltd. mill in Port Mellon, B.C. That project will cost $[illegible]80 million. Howe Sound will then build a new [illegible]0,000-tpy newsprint mill at Port Mellon in a $355-million program targeted for completion in 1991. Celgar Pulp Co., partly owned by Japanese and American interests, recently approved a $630-million program at Castlegar, B.C., to double bleached softwood kraft market pulp capacity and upgrade environmental systems.

Entrepreneurial investment is also a key factor in the Canadian industry, particularly in the area of bleached chemi-thermomechanical market pulp (BCTMP). Millar Western Pulp Ltd. is proceeding with a second greenfield BCTMP mill with capacity for 240,000 tpy at Meadow Lake, Sask. The $235-million project is scheduled for completion in 1992. Fibreco Export Inc. is building a second, 180,000-tpy BCTMP plant at Taylor, B.C., for startup in 1993 at a cost of $195 million.

SPENDING BY CATEGORY. Spending for production-related projects totals $10.82 billion for 1989-91, up 15.0% from last year. Environmental spending plans are up a whopping 276.6%, climbing from $544 million in last year's 1988-90 survey to $2.05 billion this year. Environmental projects now claim a 15.9% share of overall spending, up threefold from last year.

Spending to control water pollution is up the most, climbing over 500% from $263 million in the 1988-90 period to $1.59 billion for 1989-91. Air quality projects show a 56.4% increase over last year, totaling $386 million. Spending for solid waste disposal is up 105% to $70 million for the 1989-91 period.

British Columbia is home to the largest share of water quality improvement projects, most of which are components of larger expansion programs. The focus of all these projects is chlorine substitution in the bleaching process to eliminate dioxin formation and installation of modern secondary treatment systems. Canfor will spend $150 million to eliminate dioxin formation and upgrade secondary treatment at Prince George, B.C., as part of a multiyear modernization and expansion program adding 1,000 tpd to bleached kraft pulp capacity. Fletcher Challenge Canada plans to spend over $200 million on environmental improvements at its three mills in British Columbia. Work includes chlorine substitution projects and new activated sludge treatment systems for the Campbell River and Crofton mills. Western Pulp Limited Partnership will install a $50-million secondary treatment system at its Woodfibre, B.C., mill by 1992.

Howe Sound Pulp & Paper boosted the environmental component of its kraft pulp mill expansion by 76% last year for chlorine substitution equipment and a secondary treatment system. MacMillan Bloedel will spend $68 million through 1992 on environmental improvements at its three British Columbian mills.

NEW PAPER MACHINES IN CANADA AT EXISTING MILL SITES

STARTED UP IN 1989

Canadian Pacific Forest, Dryden, Ont.
175,000-tpy, 285-in.-trim Valmet—uncoated free-sheet
Cascades, Kingsey Falls, Que.
25,000-tpy tissue machine
Domtar, Windsor, Que.
175,000-tpy, 330-in. Beloit—uncoated free-sheet
Finlay Forest Industries, Mackenzie, B.C.
600-tpd, 303-in.-trim Voith—newsprint
Irving Pulp & Paper, St. John, N.B.
60,000-tpy, 206-in. trim Voith—tissue
Repap Enterprises, Newcastle, N.B.
260,000-tpy, 300-in.-trim Voith—coated paper
Tembec, Temiscaming, Que.
110,000-tpy, 177-in.-trim Tampella—bleached paperboard

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Canadian Pacific Forest, Thunder Bay, Ont. **1990**
240,000-tpy, 362-in. Valmet, replacing two—newsprint
Kruger, Trois Rivières, Que. **1990**
180,000-tpy, 300-in.-trim Beloit twin wire—newsprint
Stone-Consolidated, Grand'Mère, Que. **1990**
183,000-tpy machine replacing two—groundwood specialties
Perkins Papers, Candiac, Que. **1991**
28,000 short tpy—tissue

PROPOSED (NO STARTUP DATE)

[illegible]
[illegible]

Woodyard improvements show the highest percentage growth over last year among production-related projects, rising 107.6% to $546 million. Spending in the power plant is up 43.8% to $727 million. Outlays for new paper machines declined by 21.3% in this year's survey, reflecting the startup of three machines in 1988 and the addition of only two small machines, both tissue units, to this year's list.

Pulp mill improvements account for over half of all production-related spending in the 1989-91 period. Pulp mill spending plans total $5.64 billion, up 35.0% from last year's survey. Paper machine rebuilds amount to just 9% of production spending, reflecting continued emphasis on new paper machine installations, which have a 23% share. Rebuild spending totals $974 million, up 4.7% from 1988-90.

CANADIAN GREENFIELD MILL PROJECTS
(metric tons)

STARTED UP IN 1989

Canadian Pacific Forest, Gold River, B.C.
225,000-tpy CTMP/newsprint; Beloit paper machine
Vicell Canada Tissue, Delta, B.C.
9,000-tpy dry form tissue

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Alberta Energy, Lesser Slave Lake, Ont. **1990**
110,000-tpy market bleached CTMP
Alberta Newsprint, Whitecourt, Alta. **1990**
220,000-tpy CTMP/newsprint
Atlantic Packaging Products, Whitby, Ont. **1990**
Recycled 35,000-tpy tissue and 150,000-tpy newsprint; two Voith machines
Daishowa Paper, Peace River, Alta. **1990**
340,000-tpy bleached kraft market pulp
Donohue, Matane, Que. **1990**
190,000-tpy bleached market CTMP
Howe Sound Pulp & Paper, Port Mellon, B.C. **1991**
535-tpd TMP/newsprint
Louisiana-Pacific, Chetwynd, B.C. **1991**
155,000-tpy bleached market CTMP
Alberta-Pacific Forest, Athabasca, Alta. **1992**
496,000-tpy bleached kraft pulp, delayed one year
Interchem Industries, Port Clement, B.C. **1992**
100-metric-tpd sulfite pulp mill
Millar Western, Meadow Lake, Sask. **1992**
240,000-tpy bleached market CTMP mill

PROPOSED (NO STARTUP DATE)

Alcan Aluminum, Vanderhoof, B.C.
LWC or newsprint mill proposal changed to CTMP
Asitka Resource, Kalum, B.C.
250,000-tpy TMP mill, possibly with paper machine
Makin Pulp & Paper, Britannia Beach, B.C.
220,000-tpy publication paper; 1992 target
Newstech Recycling, Vancouver, B.C.
122,500-tpy market deinked groundwood pulp mill
Nortek Forest Products, Nipawin, Sask.
100,000-tpy Stake-process hardwood market pulp
Repap Enterprises, The Pas, Man.
1,200-tpd bleached softwood kraft pulp mill
Shin Ho Canada, Thunder Bay, Ont.
150,000-tpy bleached hardwood CTMP mill
Stake Technology, Rimouski, Que.
100,000-tpy bleached hardwood market pulp
[illegible]
[illegible]

New mills and paper machines focus on newsprint, tissue, and printing/writing grades as well as on kraft and mechanical market pulp. Two new paper mills and seven new paper machines at existing facilities were started up in 1989. Canadian Pacific Forest Products Ltd. started up a new $323-million greenfield mill at Gold River, B.C., and Finlay Forest Industries Ltd. integrated its market refiner mechanical pulp mill at Mackenzie, B.C., with a $165-million newsprint machine.

Also in 1989, Domtar Inc. completed its four-year, billion-dollar modernization program at Windsor, Que., with the installation of a second new uncoated free-sheet machine. Another uncoated free-sheet unit came online at Canadian Pacific Forest Products' Dryden, Ont., mill. That project cost $175 million. Repap Enterprises Corp. Inc. installed a second coated paper machine at its Newcastle, N.B., facility in a $370-million improvement program. At Tembec Inc.'s Temiscaming, Que., mill, a new $265-million bleached paperboard machine was started up in 1989.

A second wave of newsprint capacity will hit late this year, when Kruger Inc. at Trois Rivières, Que., and Canadian Pacific at Thunder Bay, Ont., bring new machines online. Alberta Newsprint Co. Ltd., a new $360-million mill in Whitecourt, Alta., is also scheduled for startup this year. Kruger will offset its newsprint expansion by converting some capacity at Trois Rivières and Corner Brook, Nfld., to supercalendered paper. Improvements at both mills will cost $400 million. Atlantic Packaging Products Ltd. started up a recycled mill in Whitby, Ont., with one tissue machine in late 1989 and will bring online a newsprint machine there this year. Also in 1990, Stone-Consolidated Inc. will complete a $280-million groundwood specialties machine installation at Grand'Mère, Que., replacing two old machines.

Two greenfield market CTMP mills are scheduled for completion this year: Alberta Energy, Lesser Slave Lake, Alta., and Donohue, Matane, Que. The Alberta Energy mill will cost $168 million and the larger Donohue mill $289.5 million. Louisiana-Pacific is constructing a new 155,000-tpy CTMP facility at Chetwynd, B.C., for completion in 1991. The $250-million program also includes two waferboard plants.

In the kraft pulp sector, two large-scale expansions are planned in addition to the projects mentioned. Weldwood of Canada Ltd. will complete a US$290-million expansion this year to double bleached softwood kraft pulp capacity at Hinton, Alta. Also in Alberta, Procter & Gamble Cellulose Ltd. plans to expand its existing bleached softwood kraft market pulp mill in Grande Prairie, Alta., and then build a second mill to produce up to 300,000 tpy of hardwood pulp. The $365-million program is targeted for completion by 1992. ■

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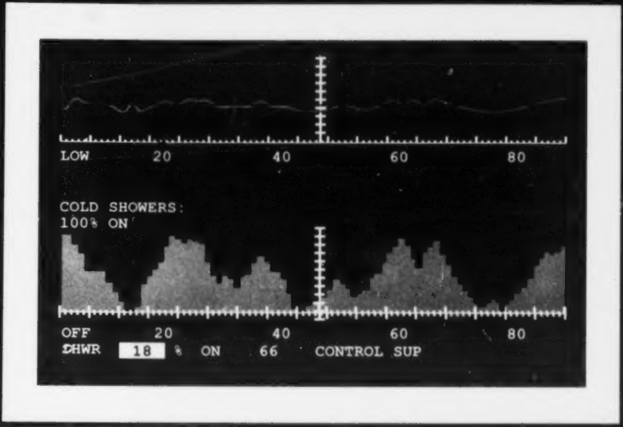
PULP & PAPER

February 1990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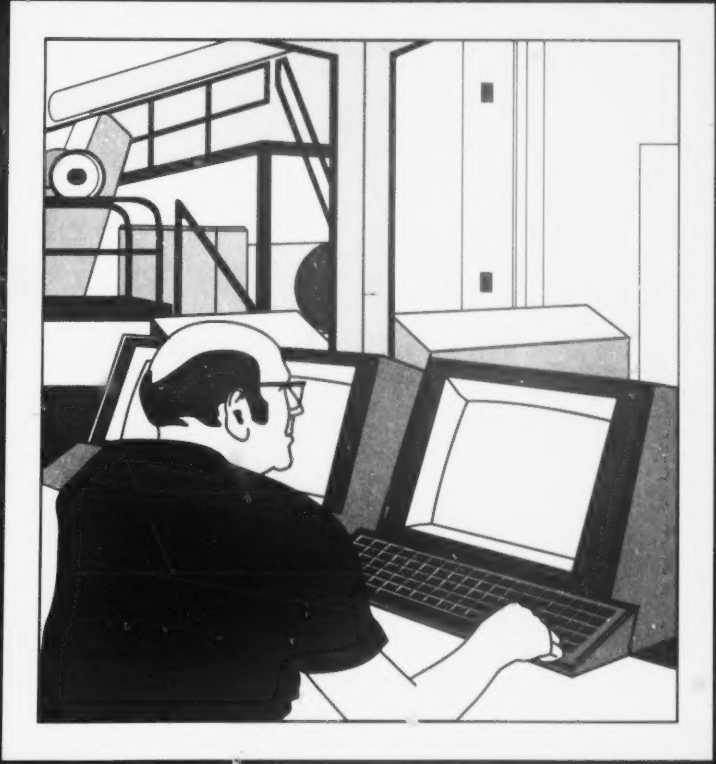

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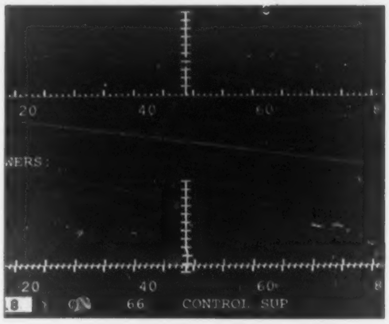

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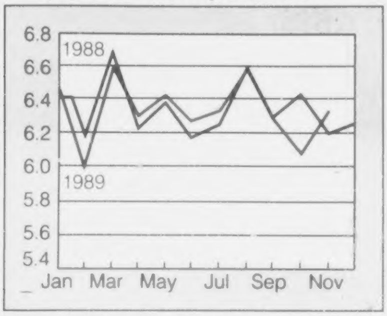
MONTH IN STATISTICS



U.S. paper and board production

U.S. production of paper and paperboard totaled 6.4 million tons in November 1989, an increase of 2.4% over the previous year, according to the American Paper Institute. After seasonal adjustments, the trend rate for total paper and paperboard stood at 76.7 million tpy, up 0.3% from 1988. Strength was concentrated in the paperboard grades, where the seasonally adjusted trend rate was up 0.9% from the previous year to 38.5 million tpy. The paper grades were down 0.2% to 38.2 million tpy.

Among major grades, uncoated groundwood continued as the main source of strength in the paper sector. Overall, production of printing and writing grades was down 1.1% through November. Containerboard production for the domestic market was up 1.1% through November, almost matching the gains in fiber box shipments. Boxboard production for domestic use were up 0.8% through the first eleven months.

Canadian newsprint shipments totaled 816,000 metric tons in November, down 3.4% from the same month in 1988, according to the Canadian Pulp & Paper Assn. Woodpulp shipments dropped 10.9% for the month, bringing the year-to-date decline to 4.1%. ■

PAPER & PAPERBOARD PRODUCTION[1]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Newsprint	Nov.	516	4.7	6,061	1.6
Uncoated groundwood (s)	Nov.	152	16.9	1,778	8.9
Coated paper (s)	Nov.	615	1.5	7,209	-2.6
Uncoated free-sheet (s)	Nov.	942	2.2	11,118	-1.5
Other printing/writing	Nov.	117	-10.7	1,515	-1.1
Total packaging and other paper (s)	Nov.	435	-0.9	4,943	-2.2
Tissue	Nov.	474	6.5	5,647	3.0
Total paper	**Nov.**	**3,250**	**2.7**	**38,270**	**-0.2**
Unbleached kraft paperboard	Nov.	1,585	5.0	19,567	1.7
Semichemical medium	Nov.	447	-5.9	5,669	0.3
Bleached paperboard	Nov.	374	4.5	4,538	0.7
Recycled paperboard	Nov.	715	0.0	8,682	-2.0
Total paperboard	**Nov.**	**3,121**	**2.1**	**38,456**	**0.9**
Total U.S. paper and paperboard output	**Nov.**	**6,370**	**2.4**	**76,725**	**0.3**

PULP, WASTEPAPER & FIBER[2]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Total U.S. woodpulp production	Oct.	5,295	4.3	62,440	2.2
Market pulp production	Oct.	682	5.6	8,790	3.3
Wastepaper consumption at paper/board mills	Oct.	1,678	5.1	19,154	1.3
Pulpwood consumption (cords)	Oct.	8,331	5.3	98,890	3.8

CONVERTED PRODUCTS STATISTICS[3]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Corrugated box shipments (billion ft²)	Nov.	25.183	0.5	289.052[6]	1.4
Containerboard inventories at U.S. box plants and mills	Nov. 1	2,451	-2.7		

INTERNATIONAL TRADE[2]

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
U.S. paper imports (including products)	Oct.	1,168	11.9	12,966	0.9
Imports of Canadian newsprint	Oct.	717	5.4	8,058[6]	n.a.
U.S. paper exports (including products)	Oct.	369	-13.4	6,333	14.0
Exports of unbleached kraft linerboard	Oct.	199	39.2	2,235	4.2
Exports of woodpulp	Oct.	502	19.2	6,360	16.8
Norscan pulp inventories[4]	Nov. 30	1,175	40.6		
Norscan pulp operating rates[4]	Nov.	93%	92%	93%	97%

CANADIAN STATISTICS[5] *(reported in metric tons)*

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Total newsprint shipments	Nov.	816	-3.4	8,849[6]	-1.5
Operating rates	Nov.	95%	98%	95%	99%
Inventories held by U.S. consumers	Nov. 30	1,195	-17.4		
Other paper/board shipments	Nov.	576	3.6	6,251	2.0
Woodpulp shipments (export only)	Nov.	586	-10.9	7,084	-4.1
Operating rates	Nov.	94%	100%	98%	98%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Tissue: New recycled tissue capacity will ease strong demand

Grade structure: Tissue falls into two major groups: sanitary and "other." About 98% of total output is sanitary, including bathroom, facial, toweling, napkins, basestock for sanitary stock, wadding, and wipes. The "other" group includes basestock for waxing, wrapping, and miscellaneous.

The two major markets for tissue are consumer and commercial and industrial (C&I). Consumer tissue is purchased by people at grocery stores, while industrial tissue is bought by hotels, offices, restaurants, schools, hospitals, prisons, and factories. About 38% of U.S. tissue production is C&I, while the larger portion is sold on the consumer market. Typical basis weights for tissue include 12 to 14 lb/3,000 ft² for single-ply bathroom tissue and 32 to 39 lb/3,000 ft² for single-ply towel.

Production/capacity: Two recycled tissue machines started up in second-half 1989: the third machine at Fort Howard Corp.'s Savannah River mill in Rincon, Ga., and FSC Paper Co.'s 70,000-tpy machine in Alsip, Ill. Atlantic Packaging Products Ltd.'s new 43,000-short-tpy recycled tissue machine in Whitby, Ont., was expected to start up in January. Irving Paper Co. started up a 75,000-tpy tissue machine based on virgin kraft pulp late last year. Three more machines are slated to start up later in 1990.

Last fall Fort Howard said it will add three new machines over the next five years. Scott Paper Co. has announced it will add capacity in North America and is evaluating various mill sites.

Outlook: In January 1989, Procter & Gamble Paper Products Co. led a 9.8% price hike on bathroom tissue sold east of the Rocky Mountains and an 8.0% increase in markets west of the Rockies (P&G is the market leader in consumer bathroom tissue). An increase of such size is unlikely to occur early this year because the economy is slowing down. Also, tissue mills no longer can cite rising pulp prices as an excuse for raising prices since pulp prices have leveled off.

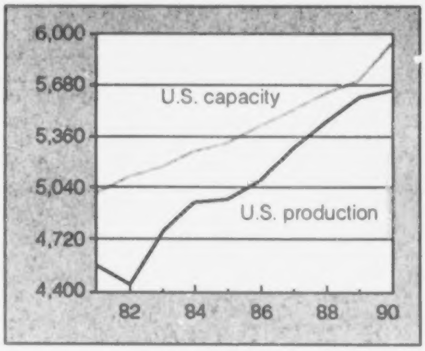
One has to take announcements of price increases in the consumer tissue market with a large grain of salt. Discounting to maintain market share often erodes price increases, and hikes are often postponed for as much as six months after an announcement. For example, last July Scott said it lost some market share in the premium branded market because its competitors lagged in implementing the hike announced in January. Producers can also manipulate sheet counts to give themselves de facto price increases. Generally, producers are lucky if they can implement half the amount of the announced increase in such a competitive market.

In a slower economy, consumers are likely to trade down to lower-priced tissue, which will hurt the large consumer tissue producers—P&G, Scott, and James River Corp. They will also be more inclined to buy private-label tissue products. Private-label napkins currently outsell all the national brands. People are likely to eat out less often, which will curtail demand for C&I tissue.

In October 1989, Fort Howard announced it was increasing the price of its towels, toilet paper, napkins, and facial tissue sold on the C&I market by 5% to 7%. Fort Howard is the market leader in the C&I sector, with about 31% market share. The company is said to be running its mills at capacity and, to avoid long lead times on orders, it decided to raise prices. Traditionally, C&I producers have slated two price increases a year, one in the spring and one in the fall. Most merchants feel a price hike this spring is likely since the increase announced last fall was accepted.

Prices: Because of the highly competitive market for consumer tissue paper, the price of tissue paper per ton is available only from the producers. Price trends tracked by the Bureau of Labor Statistics' Producer Price Index (PPI) show relative changes in price levels. Note that this is an index and not a dollar/ton price. The PPI for converted sanitary paper products, including unconverted stock (1982=100): 1980, 91.9; 1981, 98.2; 1982, 100; 1983, 102.1; 1984, 103.4; 1985, 106.6; 1986, 108.1; 1987, 109.1; 1988, 115.0; 1989 (November), 132.9.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1988	1989e	1990e
Production	5,476	5,643	5,652
Capacity[1]	5,667	5,762	5,972
Utilization	96.6	97.9	94.6
Imports[2]	60	118	114
Exports[2]	41	22	25
Apparent U.S. consumption	5,495	5,739	5,741
lb/capita	44.6	46.1	45.9
GNP ratio	2.73	2.78	2.75

e = Estimate.
1. American Paper Institute data.
2. U.S. Dept. of Commerce data.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Stone Container	2,750	14.3%
2. International Paper	1,850	9.6
3. Weyerhaeuser	1,530	7.9
4. Jefferson Smurfit/CCA	1,450	7.5
5. Georgia-Pacific	1,375	7.1
6. Union Camp	1,350	7.0
7. GN Nekoosa	1,250	6.4
8. Temple-Inland	1,235	6.4
9. Packaging Corp.	800	4.2
10. Willamette	800	4.2

Market share of top five companies:
46.6%

Market share of top ten companies:
74.9%

Total U.S. capacity (1989):
19.195 million short tons

1. Includes all of Stone Container's 49% owned Seminole kraft mill in Jacksonville, Fla., Canadian capacity.
2. Excludes Inland's 205,000-tpy recycled liner mill in Ontario, Calif.

TISSUE

Ponderosa Fibres buys mill in Wisconsin

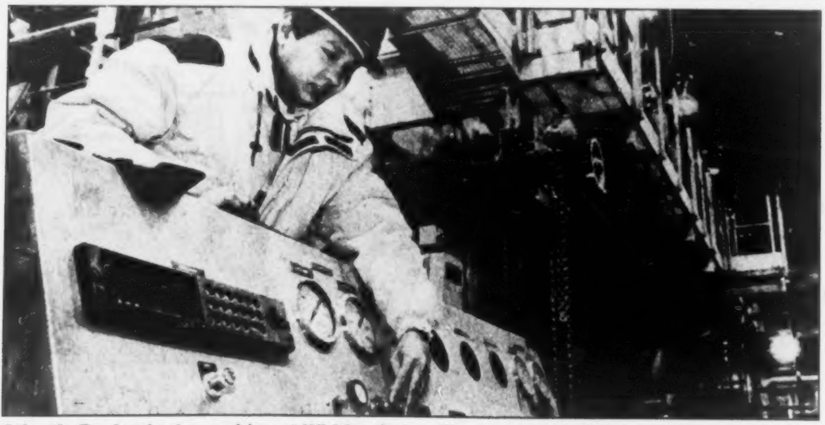
The principals of Ponderosa Fibres of America Inc., the world's largest secondary fiber market pulp producer, have purchased the former Tomahawk Tissue Corp. mill in Tomahawk, Wis. The mill, which has been idle for about one year, was scheduled to be restarted Mar. 1 under the name Tissue Recycling Co. Inc. The mill has one tissue machine that trims 82 in. When Ponderosa restarts it, the machine will make 100% recycled lightweight tissue. The deinked pulp to supply the machine will be purchased from Ponderosa Pulp Products in Oshkosh, Wis., which is believed to have capacity for about 175 tpd of bleached deinked market pulp. Tissue Recycling will also be capable of producing a lightweight tissue sheet made from 100% postconsumer wastepaper.

The tissue will be sold in parent roll form to converters serving the consumer and the commercial and industrial tissue markets. A spokesman for Ponderosa said it is possible that Tissue Recycling may eventually convert some tissue onsite. A spate of tissue machines using secondary fiber are sprouting up in the Midwest: FSC Paper Co., Alsip, Ill.; Wisconsin Tissue Mills, Menasha, Wis.; James River Corp., Green Bay, Wis., has a new deinking line; and Mosinee Paper Corp. plans to add a deinking line to Procter & Gamble Co.'s Cheboygan, Mich., mill if it decides to purchase it. In addition, Fort Howard Corp. announced last summer that it would seek permits to expand its tissue mill in Green Bay, Wis.

The spokesman for Ponderosa Fibres said he did not feel that obtaining the wastepaper for the Tomahawk mill would be a problem, as Ponderosa has been in business since the mid-1960s and has access to all the paperstock it needs. Ponderosa Fibres used to own Ponderosa Paper in Flagstaff, Ariz., which also made tissue. It later sold this mill, which is now owned by Orchids Paper Products Inc. ■

Atlantic starts up recycled tissue machine

Atlantic Packaging Products Ltd. of Whitby, Ont., said it planned to begin making recycled tissue on its new machine before the end of January. Once in full production, the new mill will make about 27,200 metric tpy of tissue and will consume about 34,000 tpy of wastepaper, including such grades as white ledger, coated book stock, and computer printout paper. The new machine will double the mill's paper capacity. Atlantic manufactures consumer tissue products from recycled paper under its own brands, such as Atlantic, April Soft, and Fiesta. It also supplies private label tissue to retailers in Canada. Harry Shelson, Atlantic vice president, said, "We have no doubt there is a consumer market for recycled paper products; we have just begun to scratch the surface." Atlantic said it plans to start up a recycled newsprint mill next to the tissue mill in 1991. ■



Atlantic Packaging's machine at Whitby, Ont., will consume 34,000 tons of wastepaper.

Scott Paper chalks up another record year

Scott Paper Co. said it expects 1989 to be its sixth consecutive year of record operating earnings but cautioned that earnings will not be as high as Wall Street had envisioned earlier last year. In an interview with the *Wall Street Journal*, Scott chairman and CEO Philip E. Lippincott said much of the blame for the lower than expected results was due to problems at some of S.D. Warren Co.'s mills, which in 1988 made up about 27% of Scott's total sales.

He said that the rebuilt coated paper machine at Muskegon, Mich., "has not run worth a damn" since it was restarted last summer. Because demand for S.D. Warren's output remains high and some categories are on allocation, these mechanical problems have hurt sales. The machine in question is No. 5. A $100-million rebuild of No. 5 was announced about a year ago, and it is expected to lift mill capacity by about 30% when completed in second-half 1990. The rebuild is being done in two phases, and the first phase was completed last summer. More rebuild work will be done on the machine in summer 1990. Lippincott said Scott plans some management changes at Muskegon and hopes to get the machine running better by the end of next summer. Scott has already rebuilt No. 4 machine at the mill at a cost of about $60 million. Both machines make heavyweight coated paper, such as that used in annual reports. The mill's capacity is estimated to be 400 tpd.

Lippincott said that earnings from its U.S. tissue business are 15% above 1988's, and both the Canadian and Taiwanese operations are performing better than expected. In Europe, however, earnings are down 20% to 30%. This is due partly to the fact that a new technique for producing bathroom tissue in France met aggressive competition. Profits are also lower in the U.K. Lippincott said consumer demand for recycled and chlorine-free products caused it to lose 1% of its market share in the U.K. He said the first order of business in the new year will be to cut the U.K. work force by 200 to 300 people, even if this causes a strike. He said the division has to become more competitive before 1992, when the European Community will unite economically.

This year he expects the company

PAPER/BOARD CAPACITY EXPANSIONS WILL EXCEED DEMAND GROWTH BY 1992

U.S. paper companies will spend $15 billion on capital outlays in '90-'92 and are focusing expectations on long-term domestic and worldwide demand growth

By NOEL DEKING, News Editor

Pulp and paper companies in the U.S. will add 8.6 million short tons of manufacturing capacity over the next three years, leading to a 3.4% average annual gain, according to the American Paper Institute's 1989 annual capacity survey. The 1989 survey continues the strong expansion trend reported in last year's survey, but this raises concern because demand for the industry's output is slowing. The industry will spend a record $15 billion annually on capital outlays in the next three years, adding capacity faster than demand is likely to grow. Nine new paper and paperboard machines were brought into production in 1989, and at least 23 additional machines are scheduled to come onstream over the next three years.

New paper and paperboard machine installations in existing mills will comprise the largest single component of growth and will represent 3.8 million tons, or 44.5% of all new capacity. New machine installations in greenfield mills will represent 1.2 million tons, or 14.3% of the total. Machine rebuilds and other miscellaneous improvements will represent the remaining 3.6 million tons, or 41.2% of the net capacity gain. The projected growth in paper and paperboard capacity will raise the U.S. industry's potential annual production to over 91 million tons by 1992, up from 88.4 million tons in 1989.

Consumption of woodpulp, wastepaper, and other fibrous materials as furnish for papermaking will increase at a 3.6% annual growth rate in the next three years, reaching 91.9 million tons by 1992. Woodpulp will continue to be the industry's primary fiber source, but wastepaper utilization is projected to grow at nearly twice the rate of virgin fiber use. This acceleration of wastepaper use exceeds the levels of use projected by producers in last year's survey. Higher levels of wastepaper consumption will be aided by the introduction of major recycling projects throughout the U.S.

Expanded use of wastepaper as a fiber source will occur even as U.S. papermakers continue to add 5.6 million tons of new woodpulp capacity in the next three years, raising the industry's total woodpulp capacity from 64.3 million tons in 1989 to 69.9 million tons in 1992. Woodpulp capacity will increase at an annual 2.8% rate, which is slightly less than the 3.4% annual rate projected for paper and paperboard. The differential between woodpulp supply and paper and paperboard production will be made up by the increased use of wastepaper as a fiber source.

PULP BOOM TO CONTINUE. A total of 4.7 million tons of new pulp capacity will be added in the chemical grade pulps, where sulfate and soda pulps dominate. About 70% of the increase will be in the bleached grades, which are used in printing and writing paper and food packaging, and 30% of the increase will be in unbleached grades, which find uses in containerboard and other packaging. The chemical grade pulps will account for 84% of all new woodpulp capacity additions through 1992, but capacities for sulfite pulp and dissolving and special alpha pulp are not expected to change.

Mechanical pulp grades have grown at a faster rate than chemical grades of woodpulp in recent years, owing to the successful introduction of thermomechanical pulp (TMP) and chemi-thermomechanical pulp (CTMP). These mechanical pulps usually replace or reduce the chemical pulp component in newsprint or groundwood paper. Mechanical pulp capacity is expected to increase by 794,000 tons in the next three years, and by 1992 TMP and CTMP capacity will total 3.8 million tons, or 51.2% of all mechanical grades.

Significant increases in market pulp capacity are also planned in the next three years, spurred by worldwide demand and high prices for bleached pulp. Market pulp capacity is expected to increase at a 4.5% annual rate, growing from 9.1 million tons in 1989 to 10.4 million tons in 1992. Mills producing market pulp for sale in the open market will represent 15% of all U.S. woodpulp capacity by 1992. Companies planning new market pulp mill expansions include Weyerhaeuser Co., Columbus, Miss.; Stone Savannah River Pulp & Paper Corp., Port Wentworth, Ga.; Bowater Southern Corp., Calhoun, Tenn.; Alabama River Pulp Co., Claiborne, Ala.; and Pope & Talbot Inc., Halsey, Ore.

WASTEPAPER TAKES OFF. Consumption of wastepaper in the manufacture of paper and paperboard will increase from an estimated 20.9 million tons in 1989 to nearly 25 million tons by 1992. The growth rate for wastepaper consumption will average 6.2% annually during the next three years, nearly twice as fast as the growth of virgin fiber sources. The percentage of wastepaper used by the industry will increase from 25.4% of fiber supply in 1989 to 27.2% in 1992. At the same time, primary and secondary woodpulp sources will drop from 74.6% of fiber supply in 1989 to 72.8% in 1992.

More than a dozen states have already implemented laws urging manufacturers to use more recycled fiber. This situation has led to a boom in secondary fiber expansion projects and proposals, as papermakers scramble to position themselves to comply with the new recycling mandate. Most wastepaper has traditionally been consumed at paperboard mills, but expansions in recycled tissue and newsprint have accelerated. More than 60 wastepaper processing projects, including several greenfield mills, are planned in the U.S. and Canada, a 50% increase over last year.

NEWSPRINT OVERSUPPLY? U.S. newsprint capacity growth will lead all other paper and paperboard grades in the next three years. Newsprint capacity will increase from 6.3 million tons in 1989 to 7.3 million tons in 1992, a 5.1% annual growth rate. This growth is paced by the addition of three new paper machines that came onstream this year plus two additional machines planned for 1990 and 1991. Companies starting up new machines this year include Southeast Paper Manufacturing Co., Ponderay Newsprint Co., and Newsprint South Inc. Alabama River Newsprint Co. will start up a new machine in 1990, and North Pacific Paper Corp., a joint venture of Weyerhaeuser and Jujo Paper Co. Ltd., will start up a new machine in 1991.

While virgin newsprint is likely to suffer from overcapacity in the next three years, there is a scramble to produce recycled newsprint containing between 25% and 50% secondary fiber content. The new Southeast Paper newsprint project and the North Pacific project will each have a deinking facility capable of supplying processed wastepaper to the newsprint machine. Additionally, Smurfit Newsprint Corp. and Garden State Paper Co. are studying locations in the Northeast for construction of new greenfield recycled newsprint mills.

Separately, the Canadian Pulp & Paper Assn.'s 1989 capacity survey projects an increase of 1.6 million tons of newsprint capacity in Canadian mills by 1991. This represents an annual growth rate of 4.7% to 12.7 million tons by 1991. Canada will add six new newsprint machines during 1989-91.

PRINTING/WRITING DELAYS SOME PROJECTS. Capacity for printing and writing paper is projected to increase at a 3.6% annual rate in the next three years, slightly below the 3.9% growth rate projected in last year's survey. Seven new paper machines, four dedicated to uncoated free-sheet and three to coated free-sheet grades, are now under construction and scheduled to be brought into production in 1990 and 1991. Between 1990-92, capacity for uncoated free-sheet will increase at a 3.5% annual rate, or a total of 1.3 million tons. Coated free-sheet will increase at an 8.8% annual rate, or a total of 1.1 million tons. Coated groundwood will increase at only a 1.5% annual rate, and uncoated groundwood will increase at a 1.1% annual rate.

The current weakness in coated paper markets has caused the recent postponement of two new coated groundwood paper machines planned by Blandin Paper Co. and Bowater Inc. Fraser Inc. has also indefinitely postponed a new lightweight coated (LWC) paper machine planned for either of the company's mills in New Brunswick or Maine. In contrast to the coated groundwood grades, capacity expansions for coated free-sheet are on schedule, including installation of the first paper machine at Champion International Corp.'s Quinnesec, Mich., bleached kraft pulp mill.

The uncoated paper market has also witnessed some

TABLE 1: **Growth trends in U.S. capacity (000 short tons).**

	Additions 1980–89		**Additions 1990–92**	
	Ten-year increase	Average annual growth	Three-year increase	Average annual growth
Total all grades paper and paperboard	**15,550**	**2.1%**	**8,653**	**3.3%**
Total paper	10,147	2.9	4,274	3.3
Newsprint	2,081	4.1	1,001	5.1
Printing/writing	7,754	4.0	2,649	3.6
Tissue	892	1.7	441	2.5
Packaging and industrial converting	(581)	(1.0)	185	1.1
Total paperboard	7,683	2.1	4,357	3.4
Unbleached kraft	5,321	3.0	2,382	3.7
Solid bleached	455	1.0	479	3.3
Semichemical	1,053	2.0	303	1.7
Recycled	855	0.9	1,193	4.0
Construction grades	(2,280)	(7.0)	21	0.3
Total all grades woodpulp	**11,443**	**2.0%**	**5,613**	**2.8%**
Total woodpulp[1]	12,651	2.2	5,608	2.8
Dissolving and special alpha	(56)	(0.4)	—	--
Sulfite	(385)	(2.1)	3	0.1
Sulfate and soda[2]	10,720	2.5	4,710	3.1
Semichemical	312	0.7	102	0.7
Mechanical	2,059	3.8	794	3.8
Construction paper and board	(1,208)	(8.8)	5	0.2

1. Excluding pulp for construction paper and board.
2. Includes screenings.
( ) = Decline.
Source: American Paper Institute.

project delays. Boise Cascade Corp. has delayed the startup of a new uncoated free-sheet paper machine at International Falls, Minn., from 1990 to 1991, and several unidentified companies have postponed new uncoated free-sheet capacity planned for 1990-91.

Lake Superior Paper Industries Inc. has delayed a decision to add a new supercalendered (SC) groundwood paper machine in Minnesota, and Daishowa America Co. has postponed plans to install a new groundwood directory paper machine at its Port Angeles, Wash., mill.

FOUR NEW TISSUE MACHINES. Four new tissue paper machines, including two in greenfield mills being constructed by Kimberly-Clark Corp., will add 441,000 annual tons of new capacity by 1992. Industry capacity will increase from 5.8 million tons in 1989 to 6.2 million tons in 1992. These new capacity additions include facilities for the production of both household and industrial tissue grades, and 80% of the new capacity will be based on wastepaper as a fiber source.

PACKAGING AND INDUSTRIAL. The long-term decline in kraft and specialty packaging and industrial paper bottomed out in 1989, and capacity is projected to increase at a 1.1% annual rate in the next three years. These additions will raise capacity from about 5.4 million tons in 1989 to 5.6 million tons in 1992. Longview Fibre Co. and Consolidated Papers Inc. are both installing new paper machines that will produce a variety of lightweight specialty packaging grades. API recently reclassified 275,000 tons of unbleached kraft paper capacity and 75,000 tons of bleached kraft paper capacity from the commodity kraft grades to specialty grades.

TABLE 2: **U.S. paper/board annual capacity, 1989-92 (practical maximum basis, 000 short tons).**

Grades	1989	1990	1991	1992[1]
Total all grades	**84,583**	**87,148**	**90,340**	**93,236**
Total paper and paperboard	**82,444**	**85,001**	**88,182**	**91,077**
Total paper	**41,326**	**42,649**	**44,342**	**45,600**
Newsprint	6,280	6,806	7,123	7,281
Printing/writing	23,811	24,393	25,492	26,460
Uncoated groundwood	1,846	1,808	1,877	1,905
Coated groundwood	4,467	4,607	4,621	4,658
Coated free-sheet	3,675	3,892	4,282	4,735
Uncoated free-sheet	12,149	12,403	13,022	13,463
Cotton fiber	205	210	212	212
Thin paper	287	288	288	289
Solid bleached bristols	1,183	1,185	1,188	1,188
Packaging and industrial converting	5,472	5,475	5,600	5,657
Unbleached kraft	2,854	2,871	2,889	2,905
Bleached packaging and industrial converting	466	429	442	442
Specialty packaging	657	660	709	722
Special industrial	1,495	1,515	1,559	1,587
Tissue	5,762	5,972	6,127	6,203
Total paperboard	**41,119**	**42,352**	**43,840**	**45,476**
Unbleached kraft	20,867	21,482	22,409	23,249
Kraft linerboard	19,195	19,781	20,543	21,280
Solid bleached	4,723	4,838	5,051	5,202
Semichemical	5,917	6,003	6,010	6,220
Recycled	9,612	10,029	10,370	10,805
Total construction paper, paperboard, and other	**2,139**	**2,148**	**2,159**	**2,180**

1. Capacity additions presented here for 1991 include only presently known commitments.

Source: American Paper Institute.

FOUR NEW LINERBOARD MACHINES. Producers of unbleached kraft paperboard will add 2.4 million tons of new capacity in the next three years, which represents a 3.7% annual growth rate. This rate of capacity growth is slightly lower than last year's estimate because producers have lowered their kraft linerboard estimate for 1991 by about 200,000 tons. Nevertheless, kraft linerboard, the major product in this category, will add 2.1 million tons during 1990-92, raising industry capacity to an estimated 21.3 million tons by 1992.

Four new kraft paperboard machines will supply 48% of the total increase in capacity, and machine rebuilds, installations of high-pressure presses, and other machine improvements will provide 52% of the total increase. Gaylord Container Corp., Union Camp Corp., and probably Weyerhaeuser (the latter must still be approved) will install new kraft linerboard machines in the next three years, but some of this new capacity will replace existing capacity that will be permanently shut down. Mead Corp. will start up a new kraft paperboard machine at the end of 1990 that will be capable of producing both coated folding carton grades and lightweight linerboard.

Recycled linerboard capacity is expected to more than double from 455,000 annual tons in 1989 to 1.2 million tons in 1992. New greenfield recycled linerboard projects are planned by Daishowa and Kenaf of North America Inc. Additional recycled containerboard projects now under study should augment this trend.

TABLE 3: **U.S. market woodpulp capacity, 1989-92 (practical maximum basis, 000 short tons).**

Grades	1989	1990	1991	1992[1]
Total market woodpulp	**9,091**	**9,335**	**9,742**	**10,382**
Dissolving	1,495	1,495	1,495	1,495
Chemical paper	7,592	7,826	8,226	8,859
Sulfite paper	252	252	252	252
Sulfate and soda paper	7,341	7,574	7,975	8,607
Bleached and semi-bleached softwood	4,176	4,378	4,661	5,159
Bleached and semi-bleached hardwood	2,975	3,007	3,124	3,259
Unbleached	190	190	190	190
All other	4	14	21	28

1. Capacity additions presented here for 1991 include only presently known commitments.

Source: American Paper Institute.

Semichemical corrugating medium capacity growth will be lower than kraft linerboard growth rates because of the increased use of recycled corrugating medium. Semichemical capacity will increase only 303,000 tons over the next three years, or only 1.7% yearly. In contrast, capacity for recycled corrugating medium will increase by 230,000 tons for an 11.3% annual growth rate.

SBS EXPANDS TO EASE SHORTAGES. The market shortage of solid bleached paperboard will be alleviated in the next three years as producers add 479,000 tons to the capacity base. This 3.3% annual growth rate will raise industry capacity from 4.7 million tons in 1989 to 5.2 million tons by 1992. Westvaco Corp. will install a fourth paper machine at its Covington, Va., mill, which will initially have 220,000 tons of capacity at startup in 1992, but this will ultimately expand to 350,000 tpy. This will be the first major new machine installation for the solid bleached sulfate (SBS) grades since Westvaco's last new machine in 1986. In Canada, Temboard Inc., a joint venture between Tembec Inc. and Jefferson Smurfit Corp., will start up a new 110,000-metric-tpy, three-ply LWC bleached paperboard machine in early 1990.

Federal Paper Board Co. will install a new LWC bleached paperboard machine at its Augusta, Ga., mill in 1992, but the machine's production will primarily be marketed as printing bristols rather than packaging grades. International Paper Co., Potlatch Corp., Temple Inland Forest Products Corp., Georgia-Pacific Corp., and Gulf States Paper Corp. have recently completed or will soon complete machine rebuilds and debottlenecking projects that will also add incremental capacity in the next few years.

Producers of recycled boxboard packaging grades have enjoyed a revival in recent years and plan to increase capacity by about 1.5% yearly in the next three years. This projected increase in capacity is nearly double the rate projected in last year's survey. Most of the incremental capacity gains will come from machine rebuilds for folding carton and chipboard grades, but U.S. Paper Mills Corp. and Newark Group will install new machines to primarily produce core stock. Capacity of recycled packaging grades, exclusive of containerboard and gypsum liner grades, will increase from an estimated 5.7 million tons in 1989 to 5.9 million tons in 1992.

Single copies of the API capacity survey are available for $325 in the U.S. and $350 overseas from the Capacity Dept., Box CMS, American Paper Institute, 260 Madison Ave., New York, N.Y. 10016. ■

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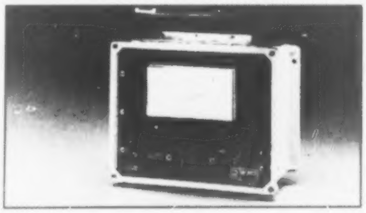

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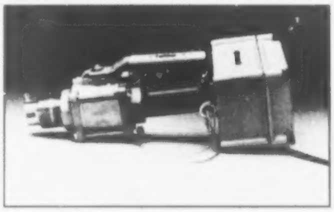

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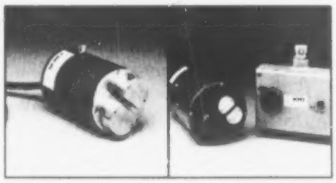

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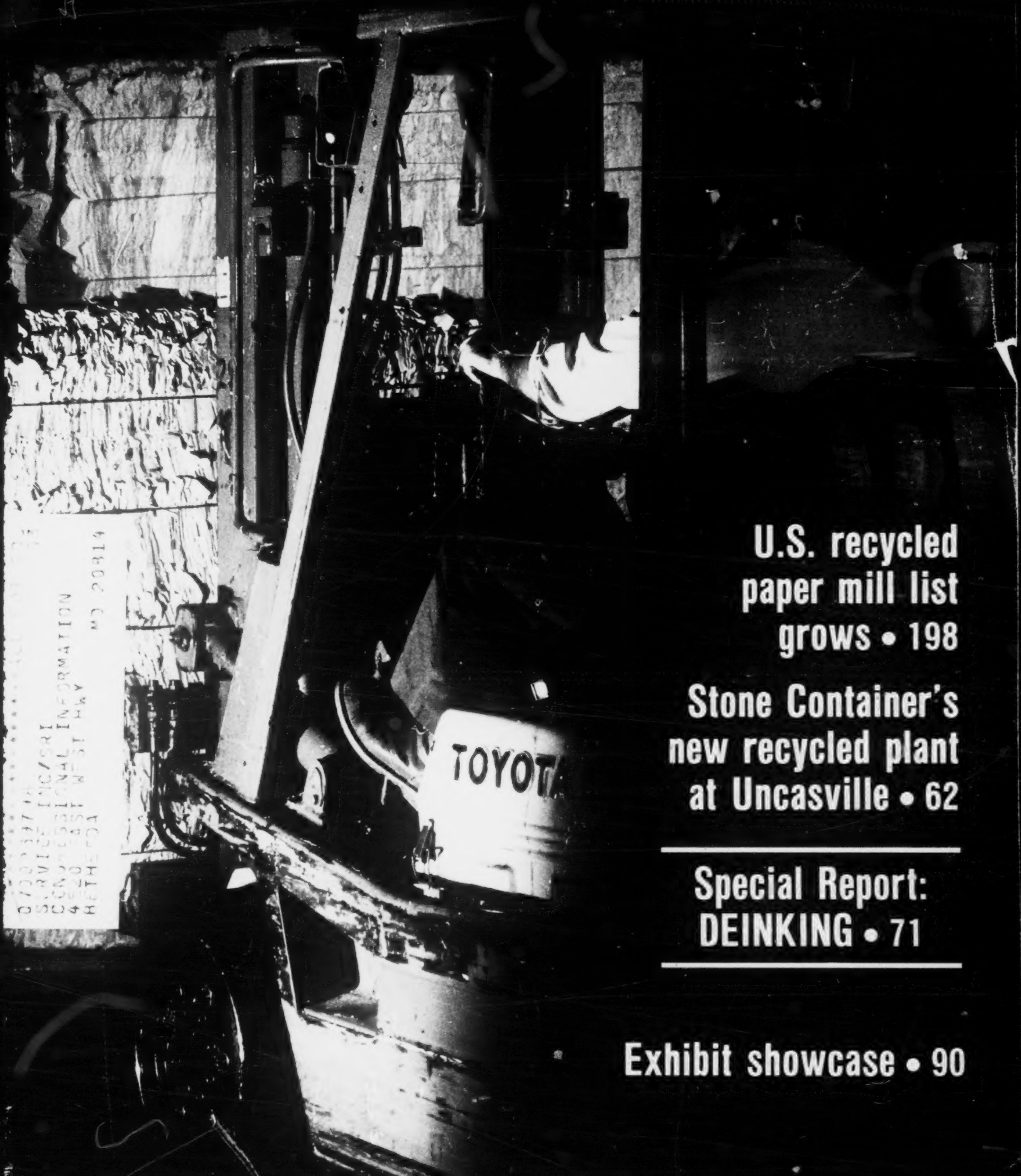

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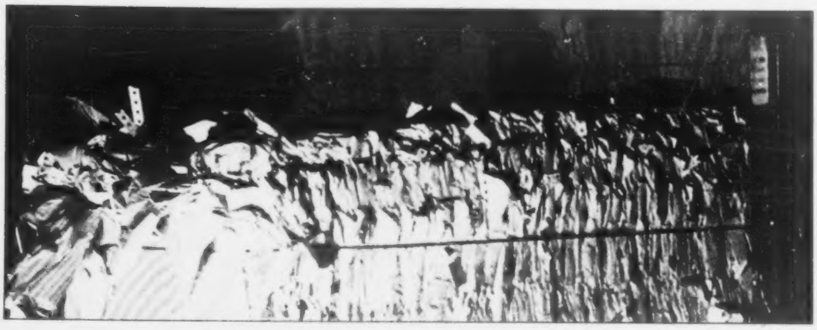

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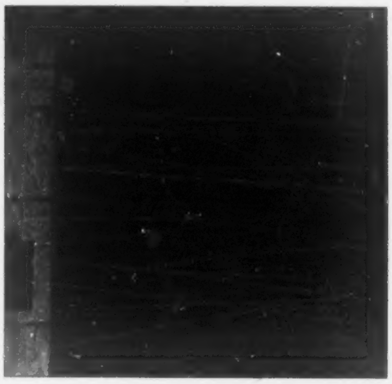

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ABP

BPA

Coated free-sheet markets continue growth in high-end printing, publishing areas

Grade structure: Coated free-sheet contains 10% or less groundwood pulp, most commonly stone groundwood. The balance is chemical pulp. Highest-quality coated paper, Nos. 1 and 2, does not have any groundwood content, while Nos. 3 and 4 may or may not contain it. Slightly over half of all No. 4 paper is free-sheet.

Almost 86% of coated free-sheet paper is coated two-side (C2S). Most of the 420,000 tpy of coated one-side (C1S) paper is free-sheet.

Basis weights for premium coated Nos. 1 and 2 are usually between 60 lb and 100 lb; Nos. 3 and 4 generally are 25 to 90 lb. About 40% of coated Nos. 3 and 4 fall below 60 lb.

Gloss is the most popular surface finish (85%), followed by dull, matte, and embossed. As measured on the Garner glossmeter, finishes are 45 or more for glossy, down to 25 for dull, and 20 or below for matte. No. 1 is 65% glossy and 25% dull, with a fraction matte and embossed; No. 2 is about 80% glossy and 16% dull; and No. 3 is 63% glossy, 33% matte, and 3% dull. Embossed represents less than 2% of any grade.

Mills such as Consolidated Papers Inc., Potlatch Corp., and Westvaco Corp. have introduced new premium or super-premium No. 1 grades that have better reproduction qualities and higher prices.

No. 2 grades are similar to No. 1 but with slightly lower quality and a wider basis weight range. The grade will post some growth in "coffee table" type magazines and books, and, especially, advertising brochures.

The largest market for coated No. 3 is for catalogs, which consume nearly 50% of all U.S. shipments, plus magazines, books, inserts, and direct mail. Growth is expected to be excellent.

Production/capacity: Operating rates in 1988 were about 97%. U.S. coated free-sheet shipments rose to about 3.3 million tons, 8% above 1987.

Capacity increased about 7% in 1988. Additional tonnage was added by Midtec Paper Corp. in Kimberly, Wis., Westvaco in Luke, Md., and International Paper Co. at Corinth, N.Y. IP will add 100,000 tpy at Corinth in 1989.

Canadian mills that make coated free-sheet include Abitibi-Price Inc. and Fraser Inc. Island Paper Mills Co., Westminster, B.C., is planning to produce an unspecified amount of coated free-sheet with an off-machine coater by 1990, and Repap Enterprises Corp. will install a machine that can make either coated groundwood or free-sheet.

Outlook: Nos. 1, 2, and 3 grades will experience the strongest growth.

No. 1, about 5.5% of the coated market, will continue to undergo excellent growth.

Producers such as Consolidated Papers, Potlatch, and Westvaco have introduced new premium or super-premium No. 1 grades that possess better reproduction qualities and higher prices than the established No. 1 paper.

Shipments of coated No. 2 also will increase, bringing its share of the coated market close to 5%.

Growth for coated No. 3 will be 5.7% annually because it is produced mostly at integrated kraft mills, which have distinct cost advantages. For a minor price increase, end users can upgrade from No. 4, normally produced at mills that must purchase kraft pulp. And the trend continues for No. 4 free-sheet demand to increase faster than No. 4 groundwood.

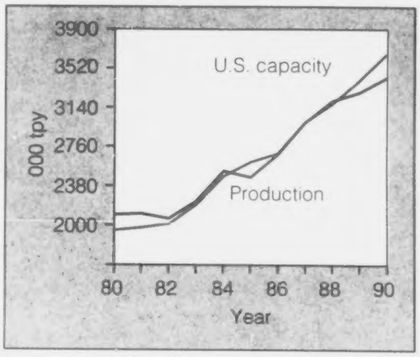
C1S paper, which is primarily used for labels, is forecast to grow at only 0.7% annually.

Markets: Commercial printers use most of the coated free-sheet paper. Major end users produce annual reports, catalogs, advertising and promotional materials, high-quality magazines, and books.

Prices: Coated free-sheet prices rose in July 1988, and producers were expected to try another price hike by March or April 1989 due to a strong marketplace.

Typical historic pricing trends ($/short ton, average price for year) are as follows for 70-lb No. 1 sheets: 1984, $1,321; 1985, $1,375; 1986, $1,350; 1987, $1,410; 1988, 1509. For No. 3 rolls: 1984, $919; 1985, $980; 1986, $945; 1987, $980; 1988, $1,115.

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

	1988[3]	1989[3]	1990e
Production[1]	3,200	3,297	3,463
Capacity[2]	3,436	3,675	3,892
Utilization rate	93%	90%	89%
Imports[1]	125	127	135
Exports[1]	58	50	52
Apparent U.S.			
consumption	3,267	3,374	3,546
lb/capita	26.48	27.08	28.32
GNP ratio	1.62	1.63	1.68

e = estimate
1. *P&P* estimate.
2. API.
3. Revised

TOP NORTH AMERICAN PRODUCERS

	Annual capacity	Market share (%)
1. Scott Paper Co.	900	22.3
2. Westvaco Corp.[1]	580	14.3
3. Mead Corp.	380	9.4
4. Consolidated Paper Co.	330	8.2
5. Potlatch Corp.	300	7.4
6. Simpson Paper Co.	290	7.2
7. Champion Papers	285	7.1
8. Repap Enterprises Corp.	240	5.9
9. Noranda Forest Inc.	194	2.5
10. Abitibi-Price Inc.	102	2.5

Market share of top five companies:
68.8%

Market share of top ten companies:
89.1%

Total North american capacity/yr (1990)
4,042
Canada (est.):
15,000 short tons

1. *P&P* estimate.

SALES AND EARNINGS

U.S. paper industry profits up 3.6% in 1989

Despite a decline in the final quarter, U.S. pulp and paper companies managed to boost earnings for the fourth consecutive year in 1989. The industry was able to report a 3.6% increase in profits on an 8.4% rise in sales, according to a *Pulp & Paper Week* survey of results from 24 companies. The increase is small, however, compared with jumps of 42% in 1988 and 46% in 1987. Chief executives warned of tougher times ahead in 1990 due to increasingly difficult market conditions for many pulp and paper grades. Flagging profit growth reflected soft market conditions for newsprint and printing/writing grades through most of last year.

Linerboard and market pulp began to weaken in fourth-quarter 1989, with tissue and boxboard among the few grade segments that still showed strength at the end. Industry profits were also helped by a strong performance from lumber and plywood operations, although mills in the Northwest were hurt by a sharp rise in woodchips costs.

Fourth-quarter 1989 earnings fell 4.4% from the final period of 1988, although sales were up 4.3%. Bad weather was also a major factor in fourth-quarter 1989, with a number of companies reporting mill curtailments due to the deep freeze in December over much of the eastern U.S. Hurricane Hugo and the San Francisco earthquake in October proved to be favorable to wood products shipments, although Hugo was responsible for driving up pulpwood costs in the southern U.S. as well. Georgia-Pacific Corp. posted a 41.5% increase in earnings to a record $661 million on a 7% increase in sales. Georgia-Pacific chairman and CEO T. Marshall Hahn Jr. attributed a nearly 49% increase in operating earnings from the company's pulp and paper operations to good progress in the tissue business, expansions, and the acquisition of Brunswick Pulp & Paper in 1988. Hahn also noted it was a good year for the building products segment. Georgia-Pacific is currently involved in a hostile takeover of Great Northern Nekoosa Corp., which it announced last November.

International Paper Co. reported its sixth consecutive year of earnings improvement with year-end profits of $864 million, up 14.6% on a 18.8% increase in sales. Fourth-quarter income was down 4.4% due to adverse weather and lower profits in the uncoated white paper business. The specialty business group continued to bolster performance in 1989, accounting for nearly 30% of the increase.

Printing/writing producers suffer. Printing/writing paper producers suffered from price discounting and a customer inventory adjustment that reduced shipments last year. Companies with newsprint mills were also hurt by a sharp erosion in prices caused by flat U.S. newsprint consumption and substantial new capacity additions in North America. Boise Cascade Corp.'s earnings fell 33% in the fourth quarter and 7.5% for the year. It said earnings were up sharply for its building products segment caused by construction work in the aftermath of Hugo and the California earthquake. But weak prices for many grades and higher chip prices in the Northwest hampered profits. Champion International Corp., a paper company with printing/writing paper and newsprint operations, saw its earnings decline 5.3% to $432 million with fourth-quarter profits down

U.S. paper/products results.

	Full year 1989 ($000)			
Companies	**Sales 1988**	**% Change**	**Earnings 1989[1]**	**% Change**
Boise Cascade Corp.	$4,338,030	5.9	$267,580	−7.5
Bowater Inc.	1,449,980	2.8	144,569	−12.0
Champion International	5,163,218	0.7	432,421	−5.3
Chesapeake Corp.	813,092	14.3	47,640	−7.5
Consolidated Papers Inc.	952,521	6.2	167,919	12.0
Federal Paper Board Co.	1,310,143	17.3	205,480	43.4
Gaylord Container (9/30)	746,000	11.1	39,400	−6.0
Georgia-Pacific Corp.	10,171,000	7.0	661,000	41.5
Great Northern Nekoosa	3,863,100	8.3	321,100	−6.0
International Paper Co.	11,400,000	18.8	864,000	14.6
Kimberly-Clark Corp.	5,733,600	6.3	423,800	11.9
Louisiana-Pacific Corp.	2,009,500	11.7	192,600	−35.7[2]
Mead Corp.	4,612,100	3.3	215,800	−38.8[2]
Mosinee Paper Corp.	233,114	0.5	6,651	−29.8[2]
Pope & Talbot Inc.	618,758	20.2	43,637[2]	36.6
Potlatch Corp.	1,227,622	13.2	136,715	21.7
Scott Paper Co.	5,065,600	7.2	375,500	−6.3
Sonoco Products Co.	1,655,830	3.5	103,561	7.6
Temple-Inland	1,894,200	6.8	207,400	4.1
Union Camp Corp.	2,761,337	3.8	299,400	1.4
Wausau Paper Mills Co. (9/31)	317,097	11.6	20,912	30.7
Westvaco Corp. (10/31)	2,327,576	8.4	223,090	11.3
Weyerhaeuser Paper Co.	10,105,610	8.3	601,407	6.3
Willamette Paper Co.	1,891,824	10.2	191,056	18.6
Total	**$80,660,852**	**8.4%**	**$6,192,638**	**3.6%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. **Louisiana-Pacific:** Reflects 1988 gain on final settlement of Redwood National Park condemnation. **Mead:** Includes $11,200,000 gain in sale of businesses in 1988. Year total reflects gain of $112,100,000 in 1988 relates to sale fo businesses. **Mosinee Paper:** Includes charges of $11,300,000 primarily from restructuring costs. **Pope & Talbot:** Includes a $5,555,000 gain on sale of sawmill. **Westvaco:** Fourth quarter earnings in 1989 were reduced by $0.05/share due to the impact of Hurricane Hugo.

14.1%. Mead Corp. reported earnings of $216 million, down from $364 million in 1988. The company said that fourth-quarter earnings were affected by softening demand for its uncoated paper grades, a slow startup following downtime at its Northwood pulp affiliate, and costs associated with ramping up its new Cycolor products and coated boxboard machine. Consolidated Papers Inc. showed sales and earning at record levels for the second consecutive year, however. The company reported strong demand for heavier weight coated paper, price improvements, and increased kraft pulp production that lifted earnings 12% from year-earlier levels.

Paperboard results mixed. Profits of companies heavily involved in paperboard production were mixed. Profit margins of containerboard producers were under pressure from lack of a price increase, but boxboard suppliers were able to raise prices and achieve higher profitability. Federal Paper Board Co., for example, increased its earnings 43.4% to $205 million due to strength in both its boxboard and market pulp operations, although fourth-quarter earning results were flat. On the other hand, Union Camp Corp. said softening of linerboard prices, discounting in uncoated paper, and severe weather that disrupted operations at three of four mills were behind a 20.7% fourth-quarter drop in earnings. The company reported net income of $299 million, up 1.4% from 1988.

Tissue market improving. Kimberly-Clark Corp. overcame troublesome conditions in the North American pulp and newsprint business with a 12% increase in profits. Strong operating results were registered by K-C's personal care and household consumer products businesses. Fourth-quarter profits were up 16.8%. Despite what he called "an outstanding performance" from its tissue business, Scott Paper Co.'s chairman and CEO Philip E. Lippincott said financial results in 1989 were "disappointing." Scott saw profits drop 6.3% to $375.5 million on a 7.2% increase in sales. Lippincott noted "significant manufacturing difficulties" in the company's printing and publishing paper operations as the reason for the decline. Fourth-quarter earnings tumbled 11.5%. Chesapeake Corp. cited expenses associated with its tissue expansion and new consumer products company as reasons for a 33% fourth-quarter decline in profits and a 7.5% annual drop from 1988.

Weyco takes big charge. Weyerhaeuser Co. took a $497 million pretax charge for a restructuring program, resulting in a $128.7 million net loss for the fourth quarter. The charge reduced the company's full-year earnings by 40% to $341.1 million. However, before the charge, the company's earnings of $601 million were up 6.2% from 1988. ■

RECYCLED NEWSPRINT

Canadian companies delay recycling projects

Several paper companies in Canada have announced that they are postponing plans to incorporate recycled fiber at some of their mills, and some of these may not go ahead if federal or provincial funding is not offered. However, the U.S. paper industry appears to be committed to increasing recycled paper and paperboard production capacity, according to Red Cavaney, president of the American Paper Institute.

In testimony before the U.S. Congress recently, Cavaney said, "Over the next three years, consumption of wastepaper in domestic paper mills will grow at a rate twice as fast as that of virgin fiber." However, he cautioned legislators not to tax virgin-fiber products, as it could spur growth too quickly. "Industry demand for wastepaper is projected to increase dramatically through the decade, and for some paper grades, that demand could well approach what is considered the maximum amount that can be collected," noted Cavaney. Meanwhile, the American Newspaper Publishers Assn. has encouraged Congress to promote newspaper recycling.

Wastepaper shortages expected. In Canada, too, there is growing concern that recycled projects may be built quicker than the supply of wastepaper can be generated. At the Canadian Pulp & Paper Assn.'s annual meeting late in January, CPPA president Howard Hart projected a shortage of old newspapers (ONP) in Canada by the end of this year.

Canadian companies are also more skeptical than U.S. companies about the long-term benefits of investing in recycled fiber equipment. Not only do possible secondary fiber shortages concern them but also wastepaper may not be feasible for those that are remote from metropolitan areas. They are starting to ask local and federal agencies for assurances of their commitment to recycling and for financial assistance.

Kruger Inc. said it would build a C$53-million deinking plant adjacent to its newsprint mill in Bromptonville, Que., only if assured of government support. Cascades Inc. said it delayed its own recycled business paper mill project, but it could be back on track as early as this month.

Cascades has been looking at several locations for a joint venture with Steinbeis & Consortium GmbH (*P & P*, Nov. 1989, p. 39). Using the Fed. Rep. Germany company's technology, a 100,000-metric-tpy recycled computer printout and copier paper mill would use 100% ONP. Depending on where the mill is built, it could cost from C$40 to C$150 million.

Cascades thought it would have made its decision by late January. The sites considered included Niagara Falls, N.Y., Montreal, Que., East Angus, Que., and Cap de la Madaleine, Que. New York State, meanwhile, is trying to sway Cascades toward Niagara Falls. The company has met twice with local and state officials, who have outlined an economic incentive package, according to local reports.

Meanwhile, in Quebec City, Que., late in January, Forestry Minister Albert Cot said a new program to encourage mills to use ONP and old magazines would be submitted for cabinet approval within three to four weeks. This could include financial aid for new deinking plants. To qualify, deinking plants would have to draw at least 50% of their raw materials from Quebec. The province's Forestry Act may also be amended to require greater use of not only wastepaper but also woodchips to conserve dwindling forests.

In Alberta, the province's Liberal environmental critic Grant Mitchell criticized the provincial government for attracting kraft pulp mills to the province while the North American trend is toward recycling, according to the *Toronto Globe & Mail*. Alberta

Newsprint Co. president Ron Stern said recently that deinking equipment would be added to the new mill, which is scheduled to start up this summer, if sales are at risk. However, 60 to 65% of the mill's output will be exported. MacMillan Bloedel Ltd. is the sales agent.

CPPA's agenda includes recycling. CPPA's Hart noted in late January that even if six out of ten old newspapers in Ontario, or an estimated 340,000 tons, were to be collected for recycling, there would still be a shortage. Canadian mills would be forced to import the rest. CPPA has transferred recycling from its environmental agenda to its economic agenda, noted John Houghton, president of Quebec & Ontario Paper Co. Ltd., the only producer of recycled newsprint in Canada. Q&O recently began testing recycled newsprint made from 100% ONP. Previously, the stock had contained 55% ONP. The company said it would see how the paper ran on its customers' presses and would wait awhile before it began making 100% recycled newsprint on a regular basis. ■

North American recycled newsprint projects, 1989-91 (announced).

Company	Mill/location	Capacity (metric tons)	Startup	Recycled content (%)
Southeast Paper	Dublin, Ga.	215,000[1]	1989	95-100%
Atlantic Packaging Corp.	Whitby, Ont.	136,100[1]	1990	100
Augusta Newsprint Co.	Augusta, Ga.	90,000[2]	1990	25-40+
North Pacific Paper Corp.	Longview, Wash.	230,000[2]	1991	25-40+
Canadian Pacific	Thunder Bay, Ont.	100,000[2]	1991	40+
Forest Products Ltd.	Gatineau, Que.	182,500[2]	1991	40+
Proposed				
Bowater Inc.	Calhoun, Tenn.	132,500[2]	1991	n.a.
MacMillan Bloedel Inc.	Port Alberni, B.C.	n.a.[2]	n.a.	n.a.
	Powell River, B.C.	n.a.[2]	n.a.	n.a.
Fletcher Challenge Ltd.	Crofton, B.C.	n.a.[2]	n.a.	n.a.
	Elk Falls B.C.	n.a.[2]	n.a.	n.a.
Kruger Inc.	Bromptonville, Que.	n.a.[2]	n.a.	n.a.
Garden State Paper Co.	Northeast U.S.	n.a.[1]	n.a.	100
Smurfit Newsprint Corp.	Northeast U.S.	255,000[1]	n.a.	50+
	Newberg, Ore.	275,000[1]	n.a.	50+
Balaclava Enterprises	Vancouver, B.C.	122,500[2]	1991	n.a.
Great Northern Paper Co.	E. Millinocket, Maine	250,000[2]	n.a.	40
Donahue Inc.	Clermont, Que.	n.a.[2]	n.a.	n.a.
Bear Island Paper Co.	Ashland, Va.	n.a.[2]	n.a.	n.a.
Atlantic Packaging Corp.	Whitby, Ont.	n.a.[1]	n.a.	100

1. New paper machines.
2. Deinking to be added to existing mills (except Balaclava's market deinked pulp mill).

Atlantic Packaging delays Whitby startups

Atlantic Packaging Products Ltd. announced that wastewater treatment plans have delayed startups for recycled tissue and newsprint machines at the Whitby, Ont., mill.

Meanwhile, it was learned that Kruger Inc. has also pushed back the projected startup of its 180,000-metric-tpy newsprint machine at its Trois Riviéres, Que., mill until later this year or early in 1991. It was previously expected to come onstream in the third quarter, and, initially, No. 10 was to start up in late 1989.

At Atlantic Packaging's Whitby mill, a two-phase project had scheduled startup of a 32,000-tpy tissue machine for early 1989, but the machine is just now coming onstream. The second phase of the project, a 134,500-tpy newsprint machine, will not come online until late this year. The mill is designed to accommodate a second newsprint machine and additional capacity for tissue or containerboard. The company uses both washing and flotation in its deinking system at Whitby. The two-process system is the new trend in deinking as it processes both ONP and coated magazine paper and produces fiber with beneficial characteristics. ■

More states adopt recycled newsprint laws

Several states in the U.S. have been added to the roll of those seeking legislative remedies for a glut of old newspapers (ONP). However, some states have begun to negotiate settlements outside the law, with publishers agreeing voluntarily to increase consumption of recycled newsprint.

Maryland, Vermont, Missouri, and South Dakota are among states that have moved toward some type of mandatory recycled newsprint consumption law over the past months. New York, New Jersey, New Hampshire, and Pennsylvania, however, are working on voluntary guidelines.

In January, the New York Newspaper Publishers Assn. accepted recommendations from a New York State newspaper recycling task force calling for voluntarily increasing recycled newsprint consumption from 7% to 40% by the year 2000.

New York's voluntary agreement. The task force's proposal also includes steps to attract a recycled newsprint mill to the state. Several newsprint manufacturers reportedly have expressed interest in such a project. The state Economic Development Dept. would develop an incentive package for such a project and appoint a manager to handle environmental permits and other details.

In Pennsylvania, newspaper publishers reportedly agreed to use at least 50% recycled newsprint by 1995. The Scripps-Howard newspapers said they would quadruple use of recycled newsprint in 1990, and others have made similar statements.

In Wisconsin late last year, the Wisconsin Newspaper Assn. reached an agreement with state legislators on a recycled newsprint bill filed last fall. WNA was able to negotiate voluntary guidelines in the pending legislation as well as decrease the percentages of recycled newsprint consumption required and extend the deadlines for compliance.

Recycled pulp content in newsprint consumed in the state would go from a 5% requirement in 1991 to 20% in 2001 (see table on p. 31). Also, publishers would be exempt from compliance if recycled newsprint is not available in the quantity, of the quality, or at the price comparable to virgin-fiber newsprint.

Maryland proposal unique. A bill was prefiled in early January in

Maryland with a new twist on the trend these recycling laws have taken. It sets mandatory consumption goals at 20% in 1992, moving up to 40% by 1994. However, publishers would be exempt from these goals if they forego their sales tax exemption.

"It's one of the most skillfully crafted bills I've ever seen," noted Kevin Grant, of the American Newspaper Publishers Assn. "It's putting heat not only on the production side of it, but on the consumption side too. The state has something the publishers want and they have something the state wants."

U.S. recycled newsprint legislation.

State laws	Fees or credits[1]	Consumption[2] goal timetable		Status
California	Penalties not to exceed	25%	1/1/91	Passed
	$1,000/violation			
Connecticut		20%	1993	Passed
Florida	10c/ton tax until 10/92;	50%	1992	Passed
	50c/ton if goal not reached			
Illinois	10c/ton tax; penalties not	10%	1992	Pending
	to exceed $5,000/violation	50%	1998	
Louisiana	10c/ton tax			Failed
Maryland	$30/ton credit on recycled	20%	1992[3]	Pre-filed
	newsprint consumed over goal	40%	1994	
Massachusetts	$56/ton credit on recycled			Pending
	newsprint			
Missouri	H.B. 949 10% of the cost/ton	10%	1992	Pending
	of Virgin newsprint consumed	50%	1996	
	S.B. 513	10%	1993	Filed
		50%	1997	
Nebraska	$1/ton tax			Failed
New Jersey	A.B. 4809	45%	1990[4]	Pending
		90%	1992	
	A.B. 4703	45%	1989	Pending
		90%	1991	
New York	Paper not meeting			
	requirement not to be sold in state		1991[4]	Failed
N. Carolina	10c/ton tax			Failed
Oregon	$1/ton tax			Failed
Rhode Island	$11/ton tax by 1991;			Pending
	$56/ton by 1994			
S. Dakota	10%/ton cost of virgin	10%	1992	Drafted
	newsprint used short of goal	50%	1996	
Vermont		25%	1991	Pre filed
Virginia	10c/ton tax			Failed
Wisconsin	$500 maximum penalty	5%	1991[5]	Pending
	for not reporting	20%	2003	
Federal laws:				
S.B. 1763	Credits for excess recycled	10%	1990	Pending
	newsprint made is transferable	30%	2000	
S.B. 1764	Credits for excess recycled	15%	1992	Pending
	newsprint used is transferable	40%	2000	

Does not include preference purchasing provisions for government agencies. Includes states where legislation is most advanced.

1. Fees are generally taxes or penalties on virgin-fiber newsprint consumed. Credits generally apply to recycled-fiber newsprint used, and are usually used to offset taxes/penalties.
2. Applies to amount of total consumption that must be recycled-fiber based, unless otherwise noted. Ranges imply goals to be phased-in between these dates.
3. Goals are aggregate of recycled fiber consumed in proportion to total newsprint consumed by individual publisher.
4. State task force has proposed voluntary guidelines. (New York's proposal is to increase recycled newsprint consumption gradually from 7% in 1990 to 40% by 2000.)
5. Goals are aggregate of statewide recycled fiber consumed in proportion to total newsprint consumed. Compromise reached late in 1989 proposes to make all consumption goals voluntary and only applicable when recycled-fiber newsprint is available in the quantity, at the quality, and of competitive price to virgin-fiber newsprint.

Source: American Newspaper Publishers Assn.

Complex formula in Missouri. In Missouri, the state senate and assembly each have a bill pending. House bill 949 calls for mandatory recycled newsprint consumption to start at 10% in 1992 and move up to 50% by 1996. Penalty for noncompliance is based on a complicated formula, which is as follows: 10% of the cost of the virgin newsprint consumed that year is multiplied by the recycling target, and from that figure the actual recycled newsprint consumed is deducted. Missouri senate bill 513 starts with a goal of 10% in 1993 and increases by 10% yearly to 50% by 1997.

South Dakota has drafted a bill that reportedly starts with a 10% recycled consumption target for 1992 and increases to 50% by 1996. Noncompliance would be penalized by 10% of the cost of any virgin newsprint consumed short of the goal. ■

Maine introduces recycled newsprint legislation

Maine has introduced new legislation to mandate recycled newsprint consumption that resembles parts of laws adopted in California and Connecticut last year. The bill defines recycled newsprint as in the California bill and raises consumption requirements to 90% by 1997 as in the Connecticut law.

Legislative Document 2133 defines newsprint: "uncoated paper, whether supercalendered or machine finished, of the type generally used for, but is not limited to, the publication of newspapers, commercial advertising inserts, directories, or commercial advertising mailers, which is made primarily from mechanical woodpulps combined with some chemical woodpulp." To be considered recycled newsprint, these grades must contain 40% postconsumer wastepaper. The bill proposes to require that these consumers increase the portion of recycled newsprint they use. The requirements start at 20% in 1993 and are raised by 10% each year to 90% in 1997 and beyond. However, if recycled newsprint is not available at a comparable price to virgin newsprint or within a reasonable period of time, the requirements can be waived. LD 2133 was written with to help the state implement its new comprehensive recycling law, which sets a 25% state recycling goal by 1992 and a 50% goal by 1994. ■

TISSUE

James River leads 5.7% hike on consumer tissue

James River Corp. announced that effective with orders as of Feb. 19 it would implement a 5.7% increase on its bathroom tissue brands sold on the consumer market. The increase will affect all of James River's national brands, such as Northern, Aurora, and the Marina brand on the West Coast. It isn't known whether the other big producers in the market, Procter & Gamble Co. and Scott Paper Co., will follow the increase. P&G commands about 30% of the market and in the past has shown itself to be concerned more with maintaining operating rates than maintaining prices, in the view of some of its competition.

About one year ago, P&G led a 9.8% increase on bathroom tissue in the East and an 8.0% increase in the West. This hike was supported by the other big players, but they certainly didn't succeed in getting all of the increase. With pulp prices plateauing, this year's more modest increase may have difficulty sticking.

Analyst George B. Adler of Smith Barney, Harris Upham & Co. commented, "The tissue market right now is strong enough . . . it's really a question of how much the supermarkets are aware of what is going on in the pulp market."

Tissue production in the U.S. was running at an annual rate of 5.647 million short tons through the first 11 months, a 3.0% increase from the year-earlier period, according to the American Paper Institute. This puts the operating rate at about 98%. Imports provide further proof that the tissue supply is tight; they were up 88.1% through the first ten months to 119,323 tons, the Dept. of Commerce reports. Exports declined 51.1% to 22,119 tons.

Tissue producers have been using the excuse that supplies are tight to push through price increases in the commercial and industrial tissue market. Scott and Fort Howard Corp. have both announced large expansion plans said to be needed to keep up with demand. Scott's new mill is expected to rely heavily on wastepaper for fiber, as are most new tissue machines coming onstream. Mills are finding that by incorporating more secondary fiber they can shield themselves from higher pulp costs. API noted 80% of new tissue capacity coming onstream in the next three years will be wastepaper based. ■

Procter & Gamble plans tissue expansion

Procter & Gamble Paper Products Co. has announced plans for a major expansion of its toilet tissue and paper towel business in the U.S. "at a cost well in excess of $100 million." The company has authorized funds to increase the output of its existing mills and plans to build at least one new paper machine, according to Gary T. Martin, tissue and towel category general manager. The company's present manufacturing sites include Mehoopany, Pa., Green Bay, Wis., Albany, Ga., and Oxnard, Calif.

Options under consideration include adding a new paper machine at Oxnard or building a new West Coast facility for a capital cost well in excess of $100 million, as well as investing substantial funds at existing plants. The Oxnard mill, which the company acquired in 1974 from International Paper Co., currently has one machine.

Martin said, "Procter & Gamble's tissue and towel business has experienced significant growth and business success. We are now operating near capacity and need to embark on a vigorous expansion to meet the growing consumer demand for our products." The company's toilet tissue and paper towel business includes Charmin, White Cloud, and Banner toilet tissue brands and Bounty paper towels.

The tissue market has been relatively tight, with operating rates in the 97% to 98% range last year and expected to be in the 95% to 96% range this year, according to George Adler of Smith Barney, Harris Upham & Co. Kimberly-Clark Corp., Scott Paper Co., and Fort Howard Corp. have recently announced major expansion projects that they say are necessary to keep up with demand. And James River Corp. announced a 5.7% increase on its consumer bathroom tissue brands effective Feb. 19. ■

CORPORATE STRATEGY

Abitibi to look at restructuring to cut costs

Abitibi-Price Inc. announced in late January that it would undertake a "broad review" of its operations in an effort to "focus on essential tasks" and reduce expenses. The company was battered by low earnings from its newsprint division last year, and the outlook for 1990 is even bleaker.

Abitibi already announced last December that it would permanently idle a newsprint machine at its Grand Falls, Nfld., mill on Mar. 1, and more closures may be in store. The company said it will let any of its approximately 16,000 workers know as early as possible of any plans that may affect them. All managers are being asked to find better ways to run their departments, a spokesperson said.

As one of the first moves in its physical restructuring, the company's two downtown Toronto, Ont., offices will be consolidated into the lakefront Queen's Quay development location by summer. Abitibi's sales office at Rockefeller Center in New York, N.Y., may also be moved, the company noted.

Industry observers have speculated Abitibi would be in trouble during a prolonged downturn in newsprint, as it is heavily vested in that grade. It is currently the second largest newsprint producer in the world. ■

Correction

The Top U.S. Producers table in the February 1990 Grade Profile on tissue contained the wrong information. The correct data is as follows:

Company	Annual capacity	Market share (%)
1. James River	1,111	18.6
2. Scott Paper	1,050	17.6
3. Procter & Gamble	900[1]	15.1
4. Fort Howard	850[1]	14.2
5. Georgia-Pacific	537	9.0
6. Chesapeake	150	2.5
7. Pope & Talbot	148	2.5
8. Erving Paper	100	1.7
9. APL	95	1.6

Market share of top five companies:
74.5%
Market share of top ten companies:
82.7%
Total U.S. capacity (1990):
5.972 million short tons

1. *P&P* estimate.

ISSUE FOCUS STOCK PREPARATION/RECYCLING

DEINKING OF SECONDARY FIBER GAINS ACCEPTANCE AS TECHNOLOGY EVOLVES

More mills are considering deinking lines as process and equipment knowledge grows, but an analysis of options is necessary

By LAWRENCE A. BROEREN

The recent explosion of secondary fiber use in paper products has been driven by economic and legislative forces. This trend is expected to continue, with the most significant growth in deinked secondary fiber.

In the U.S., wastepaper use increased from 12 million tons in 1970 to about 15 million tons in 1979 (Figure 1). It remained at about 15 million tons for the next four years but, in 1984, use began increasing again, reaching a high of 20 million tons in 1989.

The use of deinked secondary fiber in newsprint, tissue, and fine paper is expected to increase by 5.8 million tons in the next ten years (Figure 2). Most of the new supply of deinked secondary fiber—3.2 million tons—will be used in newsprint. That increase is based on a 25% utilization rate forecast for the year 2000. However, if the Environmental Protection Agency's goal of a 40% utilization rate is attained, an additional 1.4 million tons of deinked secondary fiber will be used in newsprint in the future.

Tissue manufacturers are expected to use 1.8 million tons of the new supply of deinked secondary fiber, and fine paper manufacturers are expected to use 0.8 million tons.

SECONDARY FIBER ECONOMICS, LEGISLATION. Economics is one force driving the use of secondary fiber. The operating cost of producing deinked secondary fiber can be lower than producing virgin fiber. For example, an efficient deinking mill that has an economical supply of wastepaper can produce deinked fiber for fine paper at a cost of $300 to $400/ton (Table 1). The operating cost to produce virgin kraft fiber is about $300 to $500/ton, while the market price for kraft pulp can be up to $700/ton.

Mr. Broeren is corporate consultant, Simons-Eastern Consultants Inc., Decatur, Ga.

FIGURE 1: **Annual U.S. utilization of wastepaper consisting of mixed paper, newspaper, corrugated, pulp substitutes, and deinking grades has continually increased.**

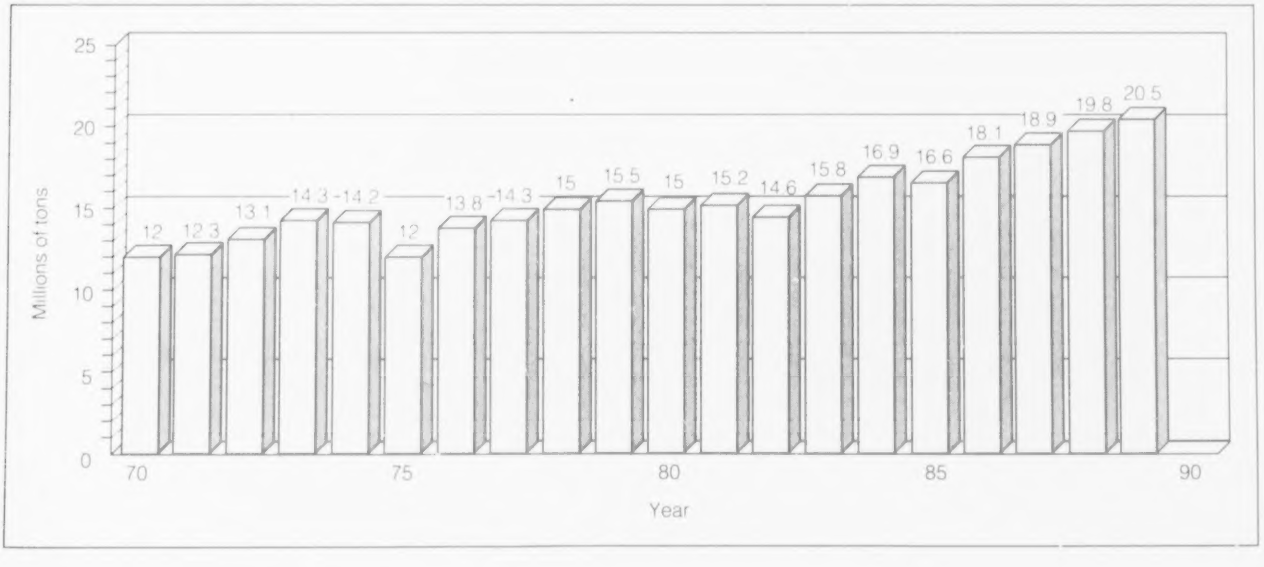


TABLE 1: **Typical operating costs to produce secondary fiber.**

	$/ton
Newsprint	140 to 170
Tissue	275 to 375
Fine paper	300 to 400

TABLE 2: **Typical capital costs (200-tpd system—in million dollars).**

	Newsprint	Tissue	Fine paper
Major equipment	8	7	11
Total direct costs	30	28	41
Total capital costs	39	36	53
Unit costs ($/daily ton)	195,000	180,000	265,000

TABLE 3: **In ten years, half of the newsprint used in California must contain at least 40% postconsumer wastepaper.**

Date of compliance	Percentage of newsprint that must contain at least 40% wastepaper
Jan. 1, 1991	25%
Jan. 1, 1994	30%
Jan. 1, 1996	35%
Jan. 1, 1998	40%
Jan. 1, 2000	50%

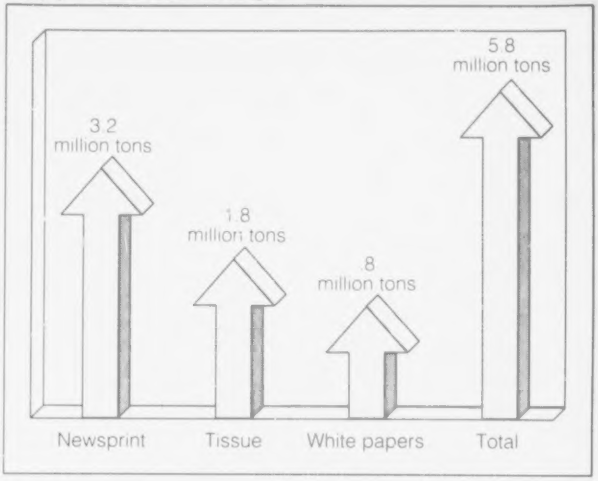
The unit capital costs for a deinked secondary fiber facility are also less than for a virgin fiber facility. Unit cost is the capital cost divided by the daily production rate. Table 2 shows typical capital and unit costs for three types of deinking mills.

The unit capital cost for a deinked fiber facility for fine paper is $265,000/daily ton and is significantly lower than the unit cost of $500,000/daily ton for a virgin fiber facility. From an operating and capital cost viewpoint, it is clear why economics is driving the increased use of deinking secondary fiber.

In addition to the economic forces, however, legislative forces are also present. The goal of legislators is to encourage or require secondary fiber use to conserve forest resources and reduce the flow of waste to landfills. Federal legislation has established recycling goals and requirements for finished products. Paper towels purchased by the U.S. government, for example, must contain a specified amount of secondary fiber.

Current state legislation focuses on using secondary fiber in newsprint. States considering recycled newsprint legislation include Illinois, New Jersey, New York, and Wisconsin. In the meantime, Louisiana, Massachusetts, Nebraska, Oregon, Pennsylvania, Rhode Island, and Virginia have legislation pending. Florida, Connecticut, as well as California have already passed legislation.

FIGURE 2: **The use of deinked secondary fiber is expected to increase by 5.8 million tons in the next ten years. Most of the new supply will be used in newsprint.**



In Florida, publishers pay a 10¢/ton tax on newsprint. The tax is refunded if the newsprint contains at least 50% recycled fiber. In 1992, the tax increases to 50¢/ton.

Connecticut requires newsprint to contain 20% recycled fiber by 1993 and 90% recycled fiber by 1998.

The California legislation, passed on September 29, 1989, is significant because California is a large newsprint-consuming state, and its environmental policies often influence the formation of environmental policies throughout the country.

In California, recycle-content newsprint is defined as newsprint containing at least 40% wastepaper (postconsumer). Publishers must use increasing amounts of recycle-content newsprint over the next ten years. In 1991, for example, 25% of the newsprint used by publishers must contain 40% postconsumer wastepaper. In 1994, 30% of the newsprint must contain 40% wastepaper. Table 3 shows the usage schedule required by the California legislation.

TECHNOLOGY. The quality of deinked pulp has been improved by technological improvements in deinking equipment and chemicals, even when low-quality wastepaper is processed. Significant improvements in technology have occurred in pulping, screening and cleaning, lightweight contaminant removal, flotation, and postdeinking fiber treatment.

- *Pulping.* High-consistency pulping decreases contaminant breakdown, which enhances contaminant removal. Wastepaper can be pulped at high consistency in batch and drum pulpers.
- *Screening and cleaning.* Low-reject-rate screens and cleaners have reduced the number of stages required for

efficient screening and cleaning.

- *Lightweight contaminant removal.* Lightweight contaminant removal has historically been accomplished at relatively low efficiencies. The new flowthrough centrifugal cleaners have higher lightweight contaminant removal efficiencies. A new mechanical lightweight contaminant removal device operates at an even higher efficiency than centrifugal cleaners but is also more expensive.
- *Flotation.* Single-stage flotation systems are available. One design is pressurized, and another is atmospheric. In the pressurized system, the foam collapses as it leaves the pressure vessel. In the atmospheric system, the foam is removed from the flotation cell by vacuum and then is collapsed.
- *Postdeinking fiber treatment.* Several postdeinking fiber treatments are available. Dispersion, the most common, can be followed by flotation and/or washing. The use of postdeinking fiber treatment has been limited due to the high capital and operating costs, but it is expected to increase during the 1990s.

WASTEPAPER GRADES. The grades of wastepaper are defined in *Circular PS-83, Paper Stock Standards and Practices*, published by The Paper Stock Institute of America. Wastepaper is categorized as follows:

- Pulp substitutes
- Deinking grades
- Newspapers
- Mixed paper
- Corrugated.

Wastepaper in each category is processed differently and used in specific products (Table 4). Deinked fiber is used primarily in three finished products—tissue, newsprint, and fine paper. Deinked fiber is widely used in tissue products, and its use is growing. Many tissue products are made from 100% deinked fiber, while most newsprint does not contain it. However, because of the recycled newsprint legislation, manufacturers and publishers are showing a significant interest in deinking. Currently, nine newsprint mills in North America use deinked fiber. Of these mills, four use 100% deinked pulp.

Some manufacturers of fine paper use deinked pulp. Due to this success, favorable economics, and environmental considerations, interest is emerging in manufacturing fine paper from deinked pulp. Table 5 lists some mills using deinked pulp in tissue, newsprint, and white paper.

DEINKING PROCESSES. Manufacturers must consider three main processing parameters as they approach the design of a deinking facility:

- Which ink removal method to use
- How many chemical loops to use
- If postdeinking fiber treatment should be incorporated, and if so, what type of treatment to use.

Ink removal can be obtained by flotation, washing, or a combination of the two. A deinking system can have one chemical loop (alkaline) or two chemical loops (alkaline and acid). Postdeinking fiber treatment, if incorporated, can include dispersion or dispersion followed by flotation and/or washing.

TABLE 4: **Wastepaper in each category is processed differently and used in specific products.**

Wastepaper category	Process	Finished product
Pulp substitutes	Pulping	Fine paper Tissue
Deinking	Fine Paper Deinking	Tissue
Newspaper	Deinking	Newsprint Folding cartons
Mixed paper	Pulping Screening Cleaning	Packing Packaging Molded products
Corrugated	Pulping Screening Cleaning	Corrugated medium Linerboard Kraft towels

TABLE 5: **Tissue, newsprint, and white paper mills throughout North America are using deinked pulp as part or all of their furnish.**

Tissue mills

- Erving Paper Mills, Erving, Mass.
- Fort Howard Corp., Green Bay, Wis.
- Fort Howard Corp., Rincon, Ga.
- Wisconsin Tissue Mills, Menasha, Wis.
- James River Corp., Glens Falls, N.Y.
- James River Corp., Green Bay, Wis.
- Kimberly-Clark Corp., various locations
- Pope & Talbot Inc., Eau Claire, Wis.
- Pope and Talbot Inc., Ransom, Pa.
- Scott Paper Co., Winslow, Maine
- Tagsons Papers Inc., Mechanicville, N.Y.
- Wisconsin Tissue Mills, Menasha, Wis.

Newsprint mills

- FSC Paper Co., Alsip, Ill.
- Garden State Paper, Carfield, N.J.
- Golden State Paper, Pomona, Calif.
- Manistique Papers, Manistique, Mich.
- Quebec & Ontario Paper, Thorold, Ont.
- Smurfit Newsprint, Oregon City, Ore.
- Smurfit Newsprint, Newburg, Ore.
- Southeast Paper Manufacturing, Dublin, Ga.
- Stone Container, Snowflake, Ariz.

White paper mills

- Appleton Papers, West Carrollton, Ohio
- Fraser, Thornold, Ont.
- Boise Cascade, Vancouver, Wash.
- P.H. Glatfelter, Neenah, Wis.
- Georgia-Pacific, Kalamazoo, Mich.
- Miami Paper, West Carrollton, Ohio
- Simpson Paper, Pomona, Calif.
- Sorg Paper, Middletown, Ohio

The preferred ink removal method is flotation, followed by washing. A one-loop alkaline chemical loop is best for tissue and white paper. For newsprint, a one-loop system is used with washing, and a one- or two-loop system can be used with flotation.

Postdeinking fiber treatment enhances the quality of deinked pulp and is often incorporated to reach the highest quality level or to allow the use of lower-quality wastepaper. The postdeinking treatment systems are relatively expensive in both capital and operating costs.

DEINKING CHEMICALS AND EQUIPMENT. The deinking process involves both mechanical and chemical systems. Both are equally important. The following chemicals typically used are for deinking and bleaching:

Deinking chemicals
- Caustic
- Sodium silicate
- Hydrogen peroxide
- Calcium chloride
- Soap

Bleaching chemicals
- Hydrogen peroxide
- Hydrosulfite.

Five major equipment suppliers can provide a complete or nearly complete deinking system: Beloit Jones, Black Clawson, Bird Escher Wyss, FiberPrep (Lamort), and Voith. These companies can supply information, assist in arranging deinking mill visits, and conduct deinking trials. Table 6 shows some of the major deinking equipment suppliers and the equipment they manufacture.

The optimum deinking system is a multi-supplier, "mix and match" system, where the most suitable equipment is selected for each process step. The capital cost is also usually lower with a mix-and-match system because the most cost-effective equipment can be selected.

Figures 3, 4, 5, and 6 show typical system designs for two newsprint deinking systems (a one-loop and a two-loop system), a tissue system, as well as a fine paper system.

TABLE 6: **Some of the major deinking equipment suppliers and the equipment they manufacture.**

Suppliers	Equipment
Ahlstrom	Drum pulpers, screens
Arus Andritz	Belt presses
Celleco	Cleaners, disc thickeners
Dorr-Oliver	Washers, disc thickeners
Finckh	Drum pulpers, screens
Hooper	Gravity deckers, screens
Hymac (Thune)	Screw presses, gravity deckers
Krofta	Clarifiers

FIGURE 3: **A block flow for a one-chemical-loop newsprint deinking system.**

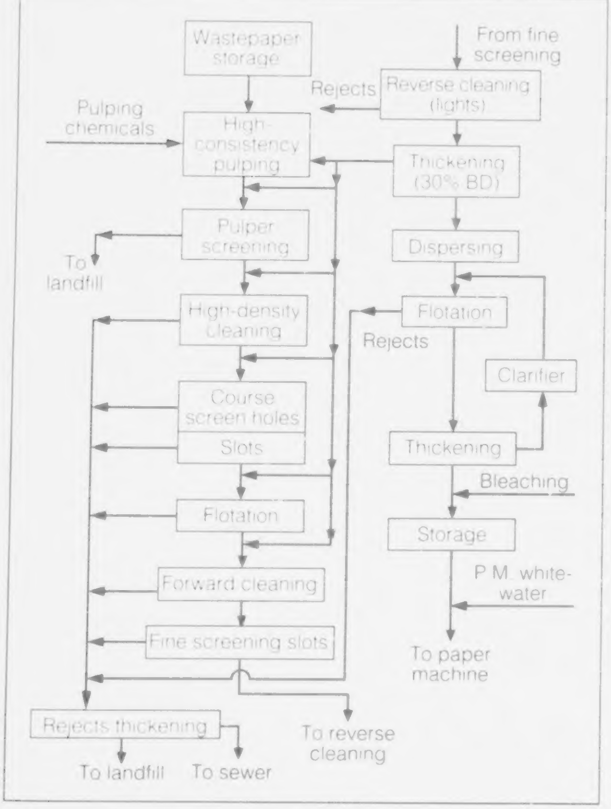
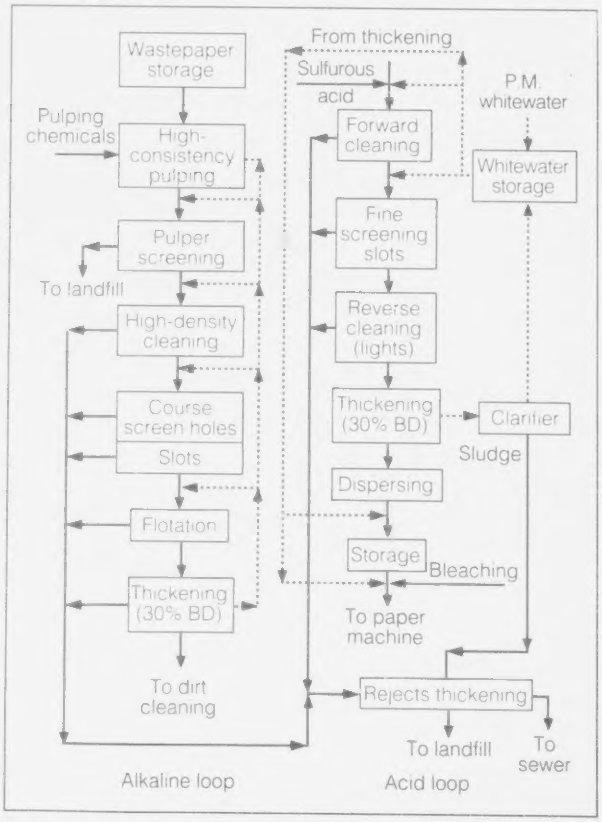

Wastepaper storage
From fine screening
Rejects
Reverse cleaning (lights)
Pulping chemicals
High-consistency pulping
Thickening (30% BD)
Pulper screening
Dispersing
To landfill
High-density cleaning
Flotation
Rejects
Clarifier
Course screen holes
Slots
Thickening
Bleaching
Flotation
Storage
Forward cleaning
P.M. white-water
Fine screening slots
To paper machine
Rejects thickening
To reverse cleaning
To landfill
To sewer

FIGURE 4: **A block flow for a two-chemical-loop newsprint deinking system.**


From thickening
Wastepaper storage
Sulfurous acid
P.M. whitewater
Pulping chemicals
High-consistency pulping
Forward cleaning
Whitewater storage
Pulper screening
Fine screening slots
To landfill
High-density cleaning
Reverse cleaning (lights)
Course screen holes
Slots
Thickening (30% BD)
Clarifier
Sludge
Dispersing
Flotation
Storage
Bleaching
Thickening (30% BD)
To paper machine
To dirt cleaning
Rejects thickening
To landfill
To sewer
Alkaline loop
Acid loop

THE ELEMENTS OF A DEINKING PROGRAM. The four major elements of a deinking program include wastepaper procurement, finished product requirements (defined by end use requirements), the deinking process (both mechanical and chemical systems), and management involvement, including support for R&D.

Procurement, including wastepaper testing, downgrading, and rejection, is the foundation of a successful deinking program. One step in developing a deinking program is a study of wastepaper availability and quality. Considerations include price, quantities, location, and shipping.

Another step is visiting several deinking facilities. Most North American deinking facilities are closed to visits, but European facilities are more accommodating. Equipment supplier presentations can also provide an opportunity to find out what equipment and processes are available.

Deinking program leaders need to bring together the people within their organization that have expertise in a variety of areas, including research, operations, management, and engineering. Engineering consultants can also be helpful.

Deinking trials should be run, but there are limitations to such trials. For example, whitewater is not recycled during a trial, and trials are usually too short to optimize chemical usage.

R&D should be part of a deinking program to assist in defining the process and finding solutions to deinking problems and operation. For example, one current problem in newsprint deinking is removing letterpress printing ink from the washing filtrate. The ink is readily removed from the fiber but is difficult to remove from the filtrate during clarification. Hence, it is recirculated back into the deinking process. As the use of letterpress printing increases, a way to get the letterpress ink out of the system will have to be developed.

Likewise, nonimpact inks are difficult to remove and, further, can show up in the finished product as ink specks. As new inks, binders, and printing processes are developed, there will be no shortage of problems that will need to be solved. It is important, therefore, for management to support R&D so it can meet the challenges deinking provides.

A list of the critical factors in developing a successful deinking program includes the following:

- Acceptance
- Research
- Development
- Investigation
- Reasonable facility
- Procurement.

Finding the right combination of deinking equipment and processes is like trying to solve Rubic's Cube. There are numerous ways to solve the puzzle, and, at first, the myriad of combinations and interrelationships of moves can be overwhelming. As time goes on, however, the patterns and results of moves become clearer. ■

FIGURE 5: **A block flow for a tissue deinking system.**

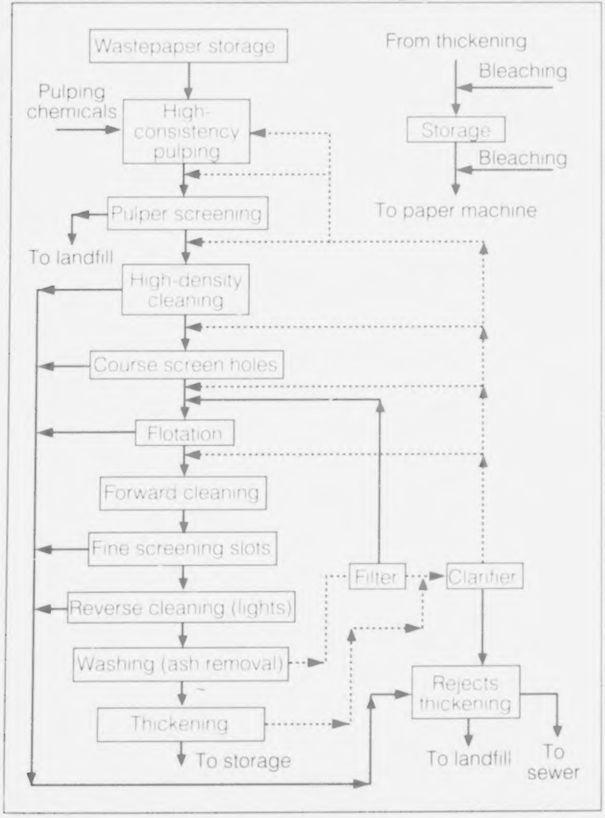
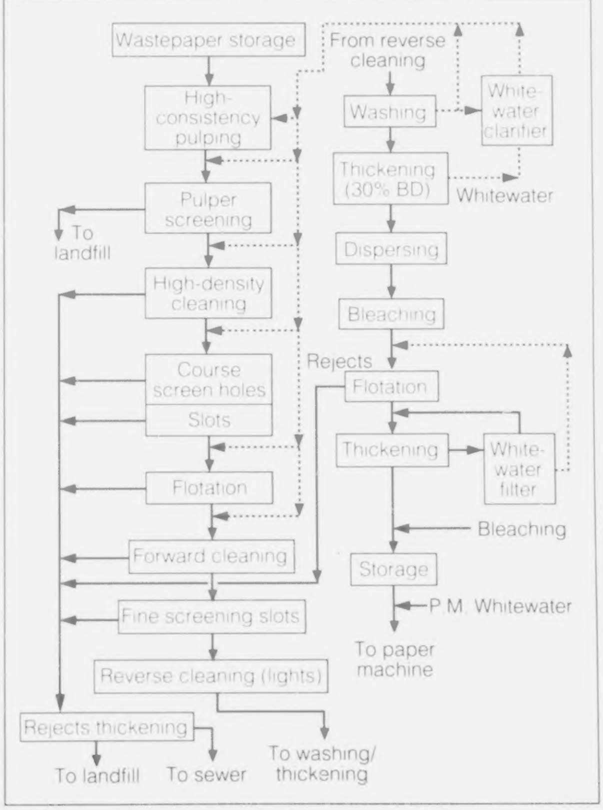

Wastepaper storage
Pulping chemicals
High-consistency pulping
Pulper screening
To landfill
High-density cleaning
Course screen holes
Flotation
Forward cleaning
Fine screening slots
Reverse cleaning (lights)
Washing (ash removal)
Thickening
To storage
From thickening
Bleaching
Storage
Bleaching
To paper machine
Filter
Clarifier
Rejects thickening
To landfill
To sewer

FIGURE 6: **A block flow for a fine paper deinking system.**


Wastepaper storage
High-consistency pulping
Pulper screening
To landfill
High-density cleaning
Course screen holes
Slots
Flotation
Forward cleaning
Fine screening slots
Reverse cleaning (lights)
Rejects thickening
To landfill
To sewer
To washing/thickening
From reverse cleaning
Washing
White-water clarifier
Thickening (30% BD)
Whitewater
Dispersing
Bleaching
Rejects
Flotation
Thickening
White-water filter
Bleaching
Storage
P.M. Whitewater
To paper machine

DEINKING EQUIPMENT DEMAND INCREASES AS MORE MILLS STUDY WASTEPAPER USE

Major suppliers worldwide discuss their process equipment developments for improving pulp cleanliness and brightness

By JOHN PEARSON, International Editor

Wastepaper looks set to become an increasingly important part of the papermaking furnish during the 1990s. Currently, worldwide wastepaper consumption is about 31% of total paper and board production. By the end of the decade, that figure could pass 40%. Pressures leading to the increased utilization rate are numerous and include environmental concerns among both consumers and governments and tight virgin fiber supplies in some countries.

Legislative changes may put a burden on papermakers to raise the wastepaper content of their furnishes. But, at the same time, consumers will continue to demand high-quality paper grades. For this reason, all major suppliers of deinking equipment are developing systems to improve cleanliness and brightness. Improved dispersion and combined flotation deinking and washing systems are among the latest developments.

BDS FORMS THE BUILDING BLOCK. Voith, of Fed. Rep. Germany, has designed a new elliptical deinking cell, said to allow better air flow to a larger surface area. Apart from this, other design aspects, such as plugging-proof injectors and self-priming air intake, remain as in previous models. To meet demands for larger systems, the company now offers a module that can handle 320 tpd of accept in one line.

Process development from Voith involves the use of dispersing machines, bleaching during dispersion, flotation after dispersion, and combined washing and flotation systems. One such system, for producing a 100% deinked furnish for newsprint, starts with what Voith calls the standard BDS sequence (pulping, prescreening at medium consistency, flotation deinking, cleaning, low-consistency screening, and dewatering). This is followed by combined dispersing and peroxide bleaching, followed by hydrosulfite bleaching. The final product has a brightness of 65 to 68 ISO.

Voith says the highest achievable results have been reached with a system consisting of a BDS sequence followed by dispersing with peroxide bleaching, flotation, thickening, and hydrosulfite bleaching. Process waters from the BDS and flotation and thickening stages are collected, treated, and recycled. The resulting pulp has a brightness of 70 to 72° and can be used in fine paper or super-newsprint grades.

For tissue production, Voith recommends BDS, followed by washing/thickening (initial brightness 65 to 70°), dispersing, hydrosulfite bleaching, and washing/thickening. Final stock brightness of greater than 80° can be reached. Process waters are clarified and ash and fillers removed. A similar system could also be used in the case of wastepaper containing a high proportion of flexo inks. Washing and clarification are said to take care of the unfloatable inks.

SPLIT FLOTATION GAINS ACCEPTANCE. Explaining its strategy, Sulzer Wyss (SEW) of Ravensburg, Fed. Rep. Germany, says it developed the concept of "split flotation" some years ago and that this idea has since found wide acceptance.

Secondary fiber used by papermakers today contains a number of printing inks, coatings, and other components that disturb the traditional deinking system. SEW says these printing inks can be divided into two groups: soft and greasy, and brittle and hard. Soft, greasy inks must be treated gently, with low energy density. If the energy density is too high, these types of inks are wiped onto the fibers, leading to greyness in the stock. For this reason, soft, greasy particles are removed before dispersion by screening, cleaning, preflotation, and washing and/or partial washing.

Hard, brittle inks are reduced to a grain size by dispersion (intensive fiber treatment). These can then be washed and floated off. Further flotation and washing can be used if necessary. SEW says this split-flotation method leads to a very clean half stuff with a high brightness. Washing out of fibers on the paper machine is also minimized by this method, says the company.

FINAL ASH CONTENT OF 2% ACHIEVED. Black Clawson Internationl, U.K., makes similar points. The trend, says the company, is to use three basic elements in the deinking process: flotation, washing, and disper-

TABLE 1: **Some recent and planned flotation deinking installations. (Table 1 continues on p. 82.)**

Country	Company name	Mill location	Startup date	Capacity (000 tpy)	Wastepaper grade	End use	Supplier
Austria	Steyrermühl	Steyrermühl	1989	84	Np, Mag	Newsprint	Voith
Brazil	Clinton Pessoa	Santa Therezinha	1988	42	Mag, Wf waste	Tissue	Sulzer Escher Wyss
Brazil	Scott Copa	Cruzeiro	1988	30	Mag, List	Tissue	Voith
Canada	Atlantic Packaging Corp.	Scarborough, Ont.	1988	60	Ctd, Unctd	Tissue	Voith
Canada	Atlantic Packaging Corp.	Scarborough, Ont.	1988	150	Np, Mag	Newsprint	Voith
Canada	Cascades Inc.[1]	Kingsey Falls, Que.	1990	64	Led	Tissue	Beloit
Canada	Cascades Inc.	East Angus	1990	21	Ctd bk, List, Mag	White board	Lamort-Fiberprep
Canada	Kruger Inc.	Bromptonville	1990	63	Np, Mag	Newsprint	Lamort-Fiberprep
Chile	CMPC	Puente Alto	1991	53	Mixed waste, Np, Mag	Tissue	Lamort
China	Yingkou[1]	—	1990	10	Np	Linerboard	Black Clawson Int
Colombia	Familia	Medellin	1991	21	Off. waste	Tissue	Lamort
Colombia	Papeles Nacionales	Pereira	1990	18	Wf	Tissue	Lamort
Costa Rica	Tissue producer	—	1989	7	Mag, Led, Ctd	Tissue	Sulzer Escher Wyss
Czechoslovakia	Steti	Steti	1991	35	Np, Mag	Newsprint	Lamort
Denmark	Brodrene Hartmann	Tondern	1989	18	Np, Mag	Egg trays	Sulzer Escher Wyss
Denmark	De Forenede Papir	Copenhagen	1991	42	Wf sorted paper	Tissue	Sulzer Escher Wyss
Ecuador	Technopapel	Quito	1990	9	Np, Mag	Tissue	Lamort
Finland	Tampella	Tampere	1991	25	Np, Mag	FBB	Sulzer Escher Wyss
Finland	United Paper Mills	Kaipola	1989	135	Np, Mag	Newsprint	Voith
Finland	United Paper Mills	Kaipola	1989	120	Np, Mag	Newsprint	Voith
France	Matussière-et-Forest	Turckheim	1988	42	Mag, Prom	Pr/wr	Voith
France	Matussière-et-Forest	St. Girons	1989	21	Mag	—	Voith
France	Papeteries du Bourray	St. Mars-la-Brière	1988	28	Prom, pr trim, List	Pr/wr	Lamort
France	Papeteries d'Essones	Corbeil-Essones	1989	42	Mag, Np, bk, lacq	Pr/wr	Lamort
Germany, Fed. Rep.	Euler	Bensheim	1988	16	NCR broke	File board	Lamort
Germany, Fed. Rep.	Friedrich Erfurt	Wuppertal	1990	28	Wf paper	Wallpaper base	Voith
Germany, Fed. Rep.	Gruber-Weber	Gernsbach	1990	53	Wdcntng, wf	Topliner	Sulzer Escher Wyss
Germany, Fed. Rep.	Haindl Papier	Schongau	1989	265	Np, Mag	Newsprint	Voith
Germany, Fed. Rep.	Hermes	Düsseldorf	1990	44	Sorted waste	Pr/wr	Sulzer Escher Wyss
Germany, Fed. Rep.	Niederauer Mühle	Düren	1989	28	Mixed waste	Board	Voith
Germany, Fed. Rep.	Not disclosed	—	1989	77	Wdcntng, wf	Tissue	Sulzer Escher Wyss
Germany, Fed. Rep.	Strepp	Kreuzau	1989	50	Wdcntng pr/wr	Tissue	Voith
Germany, Fed. Rep.	Peter Temming	Glückstadt	1990	53	Np, mag	Pr/wr	Lamort
Germany, Fed. Rep.	Peter Temming	Glückstadt	1990	35	Np, mag	Pr/wr	Lamort
Germany, Fed. Rep.	Peter Temming	Glückstadt	1990	21	Np, mag	Pr/wr	Lamort
Germany, Fed. Rep.	Not disclosed	—	1989	42	Sorted waste	Tissue	Sulzer Escher Wyss
Germany, Fed. Rep.	Not disclosed	—	1989	44	Sorted waste	Tissue	Sulzer Escher Wyss
Honduras	Tissue producer	—	1989	4	Ctd paper, Led	Tissue	Sulzer Escher Wyss
Indonesia	Fajar Surya	—	1990	25	Col. led	White board	Lamort-Aikawa
Indonesia	PT Pakerin	Surabaya	1990	28	Sorted Waste, List	Tissue	Sulzer Escher Wyss
Indonesia	PT Pakerin[1]	—	1990	8	Led	Board	Black Clawson Int
Indonesia	Surya Kertas	—	1988	21	Col. led	Pr/wr	Lamort-Aikawa
Indonesia	Surya Kertas	—	1991	21	Np	White board	Lamort-Aikawa
Italy	Cartiera Lucchese	Porcari	1990	70	Wf	MG papers	Lamort
Japan	Daini Paper	—	1988	18	Np	Printings	Lamort-Aikawa
Japan	Iyo Paper	—	1988	12	Col. leg	Tissue	Lamort-Aikawa
Japan	Hyogo Seishi	—	1989	20	—	Newsprint	Voith
Japan	Nihonkako Paper	Takahagi	1989	21	Ctd wf book	Ctd paper	Lamort-Aikawa
Japan	Nihonkako Paper	Takahagi	1989	21	Ctd wf book	Ctd paper	Lamort-Aikawa
Japan	Nihonkako Paper	Takahagi	1990	21	Ctd wf book	Ctd paper	Lamort-Aikawa
Japan	Nihonkako Paper	Takahagi	1990	21	Ctd wf book	Ctd paper	Lamort-Aikawa

[1] Flotation/washing system. Abbreviations: Ctd = coated; Unctd = uncoated; FBB = folding boxboard; Np = newspaper; Mag = magazines; Prom = promotional material; Led = ledgers; List = computer listings; Pr/wr = printings/writings; Wdcntng = woodcontaining paper; Wf = woodfree paper, HPBK = heavily printed bleached kraft.

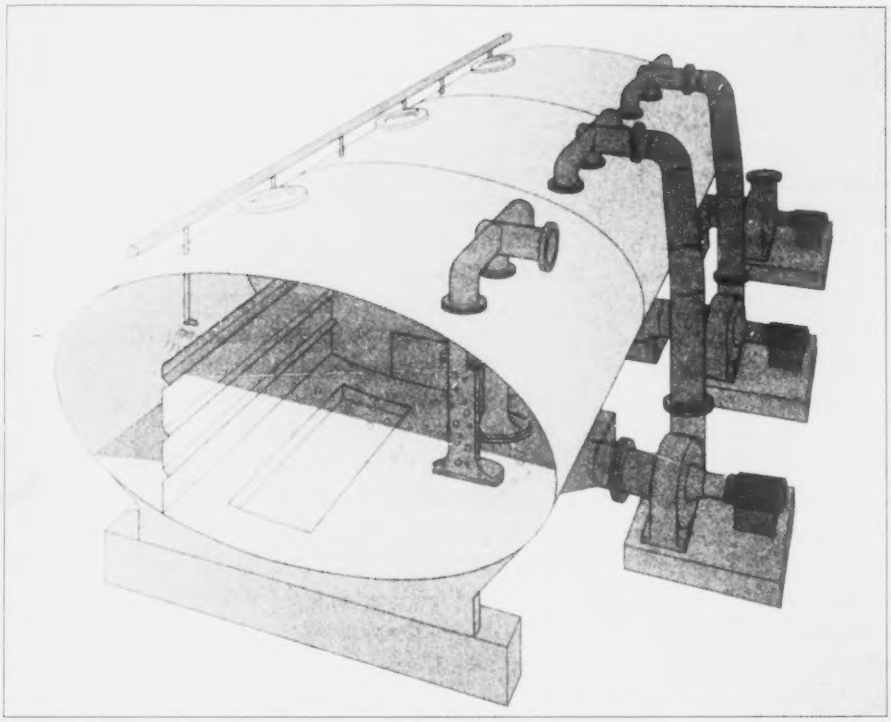
sion. Treatment of the clarified water loop to remove residual inks (particularly flexo inks) is seen as a growing trend.

For the preparation of wastepaper stock for tissue production, BCI has introduced its new DNT Washer. It is said to be highly effective in removing inks and ash. Final ash contents of less than 2% are achieved using a ledger furnish containing over 25% ash.

TABLE 1, continued: **Some recent and planned flotation deinking installations.**

Country	Company name	Mill location	Startup date	Capacity (000 tpy)	Wastepaper grade	End use	Supplier
Japan	Taio	Iyomishima	1989	45	Np	Pr/wr	Voith
Japan	Taio	Kawanoe	1989	60	Mag	Newsprint	Voith
Japan	Taio	Mishima	1989	110	—	Newsprint	Voith
Japan	Takao Paper	—	1989	35	Np, List	Comic book	Lamort-Aikawa
Japan	Tamagawa Paper	—	1990	28	Np, List	Comic book	Lamort-Aikawa
Japan	Tokai Pulp	Shimada	1989	46	Np	Copier paper	Lamort-Aikawa
Kenya	Panafrican Paper Mills	Webuye	1991	26	Wf	Pr/wr	Lamort
Rep. Korea	Mitto Paper	Seoul	1990	53	Wf waste	Pr/wr	Sulzer Escher Wyss
Malaysia	Not disclosed	—	1989	18	Led, List	Tissue	Sulzer Escher Wyss
Mexico	Inpamex (Copamex)	Uruapan	1989	35	List, white led	Pr/wr, tissue	Lamort-Licar
Mexico	Kimberly-Clark Corp.	Bajlo	1991	210	Mag, List	Tissue	Sulzer Escher Wyss
Mexico	Papeleras Higienicos	Monterrey	1989	25	Mag, office waste	Tissue	Sulzer Escher Wyss
Netherlands	Celtona BV	Cuyck	1991	26	Ctd wf board	Tissue	Lamort
Netherlands	Celtona BV	Cyuck	1990	53	Ctd wf board	Tissue	Lamort
Netherlands	Van Houtum BV	Swaimen	1990	28	Np, Mag	Tissue	Lamort
Pakistan	Packages	Lahore	1988	7	Wdcntng, Wf	Tissue, MG	Sulzer Escher Wyss
Romania	Piatra Neamt	—	1990	20	Mixed waste	White liner	Beloit
Spain	Echezarreta SA	Legorreta	1988	30	List	Printings	Lamort-Licar
Spain	Papelera d'Orpi SA	Carme	1988	5	Office waste, Np	Tissue	Lamort-Licar
Spain	Romani Esteve SA	Barcelona	1990	28	Led, News, White bd	White liner	Beloit
Sweden	Hyite Bruk[1]	Hyite	1989	175	Np, Mag	Newsprint	Beloit
Taiwan	Ban Yu[1]	—	1989	60	Np	Board	Black Clawson Intl.
Taiwan	Ban Yu[1]	—	1989	60	Np	Board	Black Clawson Intl.
Taiwan	Cheng Loong	Taipei	1990	25	Mag, Wf, List	Pr/wr	Sulzer Escher Wyss
Taiwan	YFYu[1]	—	1990	30	Led	Board	Black Clawson Int
Thailand	Hiang Seng	Bangkok	1990	18	FBB, Wf waste	Liner, pr/wr	Sulzer Escher Wyss
Thailand	Patcharavit	Bangkok	1989	9	Sorted waste	Tissue	Sulzer Escher Wyss
Thailand	Not disclosed	—	1989	14	Led, List	Tissue	Sulzer Escher Wyss
U.K.	Kimberly-Clark Ltd.	Coleshill	1991	26	Wf	Tissue	Lamort
U.K.	Shotton Paper Co.	Shotton	1989	165	Np, Mag	Newsprint	Voith
U.S.	Atlas Tissue Mills[1]	Hialeah, Fla.	1990	25	Led	Tissue	Beloit
U.S.	Erving Paper Mills[1]	Erving, Mass.	1989	32	Led	Tissue	Beloit
U.S.	F.S.C. Paper Co.	Alsip, Ill.	1990	81	Led, List, Mag	Tissue	Sulzer Escher Wyss
U.S.	James River Corp.	Ashland, Wis.	1988	37	Ctd pr/wr	Tissue	Voith
U.S.	James River Corp.	Green Bay, Wis.	1989	85	Led	Tissue	Voith
U.S.	Miami Paper	W. Carrollton, Fla.	1988	55	Led	Pr/wr	Sulzer Escher Wyss
U.S.	Miami Paper	W. Carrollton, Fla.	1988	55	Led	Pr/wr	Sulzer Escher Wyss
U.S.	Putney Paper Co.	Putney, Vt.	1989	9	Led, cup stock	Tissue	Sulzer Escher Wyss
U.S.	Smurfit Newsprint Corp.[1]	Oregon City, Ore.	1989	130	Np, Mag	Newsprint	Beloit
U.S.	Sorg Paper Corp.	Middletown, Ohio	1989	44	Book,Led,cup stock	Tissue, pr/wr	Sulzer Escher Wyss
U.S.	Stone Container Corp.[1]	Snowflake, Ariz.	1988	110	Np, Mag	Newsprint	Beloit
U.S.	Stone Container Corp.[1]	Snowflake, Ariz.	1989	125	Np, Mag	Newsprint	Beloit
U.S.	Tagsons Papers Inc.[1]	Mechanicville, N.Y.	1990	16	Np, Mag	Tissue	Beloit
U.S.	Tissue producer	—	1990	65	Ctd paper, Led	Tissue	Sulzer Excher Wyss
U.S.	Tissue producer	—	1989	23	HPBK	Tissue, pulp	Sulzer Escher Wyss
U.S.	Not disclosed[1]	—	1989	80	Led	Tissue	Beloit
U.S.	Not disclosed	—	1990	80	Np, Mag	Newsprint	Beloit
U.S.	Not disclosed	—	1990	160	Np	Newsprint	Beloit
U.S.	Not disclosed	—	1989	70	Mag	Newsprint	Voith
Venezuela	Maracay	Maracay	1990	32	Led	Tissue	Beloit
Yugoslavia	Krsko	Krsko	1990	48	Np, Mag, Led	Pr/wr,Newspr	Beloit

[1] Flotation/washing system. Abbreviations: Ctd = coated; Unctd = uncoated; FBB = folding boxboard; Np = newspaper; Mag = magazines; Prom = promotional material; Led = ledgers; List = computer listings; Pr/wr = printings/writings; Wdcntng = woodcontaining paper; Wf = woodfree paper; HPBK = heavily printed bleached kraft.



Voith's new flotation cell is elliptical for better air flow.

HYLTE SHOWS THE WAY. This year's reference list from Beloit also shows an increasing use of combined flotation-washing deinking systems. One 500-tpd line is at Hylte Bruk in Sweden. It uses Beloit's Pressurized Deinking Modules (PDMs) for the deinking process. Immediately after these, stock is treated in the forward cleaners and is then thickened and diluted four times in Hedemora disc filters and Thune screw presses. An after-flotation stage, with two more PDM units, is used to remove residual ink.

DEINKING STARTS WITH THE PULPER. Reviewing developments in deinked pulp for tissue making, French group Lamort says that new printing inks, lacquers and contaminants, present in increasing quantities, have required changes to the traditional washing-hot dispersion line. The company says it believes deinking starts with the repulping equipment. Its Helico Pulper is designed to achieve ink detachment and ink calibration adapted to washing or flotation deinking. Industrial studies using laser inks have shown that the dot count is reduced by at least 50% when changing from a low consistency to a Helipoire system, adds the company.

Flotation deinking is now commonly used in tissue systems for removing ink specks that would not otherwise be washed out. Plug-free MT injectors and the ability to operate with double or single aeration are features of the group's Verticel flotation deinking cell. The company says the Verticel achieved a market share of 35% in new deinking lines for tissue production in 1989, up from 25% in 1988.

Lamort's opinion on stickies and varnishes is that hot dispersion is not sufficient. Removal is the only cure. The T version of its Gyroclean is said to develop an efficiency of 95 to 99%, compared with 70 to 75% for conventional reverse cyclones in a single stage or lower with two or three stages. The new unit, which has a capacity of up to 520 m³/hour at 1.6% consistency, can be placed before or after flotation. For removing varnish and lacquer specks, Lamort has introduced the ELP 136, 3-in. cleaner. It is said to develop efficiencies of 85 to 95%.

Turning to newsprint production, Lamort says the deinking line put on the pulping equipment should integrate flotation deinking and washing, depending on grammage and the percentage of deinked pulp used. Again, stress is put on the deinking equipment, which should allow efficient ink detachment. For removing stickies, Lamort quotes a trial using a Gyroclean T at a European newsprint mill. The mill used the unit to clean 45% to 50% of the deinked pulp flow to its twin-wire paper machine. As a result, any unplanned downtime for wire cleaning has been eliminated, says Lamort.

Finally, on printings/writings, Lamort says that a major development is selective flotation of washer filtrate. The combined high-yield, washing-flotation system is said to result in high brightnesses. ■

DEMAND INCREASES FOR RECYCLED PRINTING AND WRITING PAPER

Improved quality and the issue of solid waste disposal has increased demand from both the public and private sectors

By ROBERT B. GALIN, News Editor

Mills, merchants, and customers are beginning to realize that recycling is an issue that won't go away. As the paper industry fights tough mandatory recycling legislation, customers are increasing their requests for access to quality recycled paper, particularly in the printing and writing grades.

"Merchants know that there's a demand out there on the part of customers for more recycled products," says John J. Buckley Jr., president of the National Paper Trade Assn. (NPTA). "This is no longer an issue of just the maniacs and the radicals—it's becoming more and more of an issue for mainline customers [such as printers]." Buckley says.

"Merchants are finding the biggest demand for recycled printing and writing paper right now is in big business [and] the government contract business," he adds.

What's leading this realization is the very visible problem of what to do with the accumulation of solid waste, about 41% of which is composed of paper and paperboard, according to the National Solid Waste Management Assn. That's about 65 million tons of garbage in 1986 alone.

"The issue of disposal of solid waste is at an absolute critical point. The paper industry is going to have to address that," says Jobe B. Morrison, president of Miami Paper Corp., a unit of Cross Pointe Paper Corp., a Pentair Inc. company. Cross Pointe sells a variety of recycled paper from its Miami mill in West Carrollton, Ohio, and Flambeau Paper in Park Falls, Wis.

Morrison says there are correlative issues, such as dioxins resulting from the bleaching of recycled fiber. He wonders if the public is prepared to accept less bright or off-color paper.

These recycled grades—as opposed to those using clean, preconsumer or precommercial waste—are not what many customers are used to seeing, explains Bill Litviak, a sales representative for Wilcox-Walter-Furlong Paper Co. WWF Paper represents Cross Pointe, P.H. Glatfelter Co., and French Paper Co.

Shelley Hamel, marketing coordinator at Earth Care Paper Co., a mail order retailer of recycled paper products, thinks the public is indeed ready for such paper. In fact, she says, the company's most popular business paper is called Minimum Impact, an unbleached, 100% recycled paper from Glatfelter. Minimum Impact has "kind of" a beige color.

The biggest problem, Hamel says, is the price differential between recycled-fiber paper and virgin-fiber paper. Currently, recycled grades cost about 10% more than their virgin fiber counterparts. The price differential has increased recently because of strong discounts in virgin-fiber uncoated free-sheet paper while demand for recycled papers has increased.

NPTA's Buckley agrees but says there's a gap between what customers say they want and what they're actually willing to pay for. "There is a strong feeling out there that no one is willing to pay more to get a recycled fiber [paper]." They may say they're willing to accept slightly lower quality and performance, but when it comes to spending more, they back off and choose the virgin fiber, Buckley says.

Still, Hamel says her company is experiencing rapid growth. "Customers want to buy recycled paper," she says. Earth Care sells copy and forms paper, stationery, note cards, and other products directly to consumers, retail stores, and other customers.

Litviak says some customers, particularly printers, had bad experiences with 100% recycled paper in the 1970s. That paper had problems with stability and runability. Now, however, improved quality has pushed demand for recycled printing and writing paper beyond the fad stage.

Currently, about 34 mills in North America are producing at least a small amount of printing/writing paper they classify as recycled (Table 1). However, many of these mills use primarily preconsumer or precommercial waste, which means they are often such "waste" as envelope clippings and other high-grade, clean white pulp substitutes.

Mills such as Hammermill Papers and Westvaco Corp. have introduced recycled grades with at least 50% wastepaper, although it is preconsumer. Nekoosa

Papers Inc. has introduced a lower-brightness copy paper made with some deinked fiber (*P&P*, Jan. 1990, p. 37).

MERCHANTS GET INVOLVED. There are essentially three issues in the solid waste problem, says Buckley of NPTA. One is stemming the reduction of resources. The second is incineration/energy generation. The third is recycling.

NPTA has formed a Solid Waste Action Network, which so far has about 100 volunteers from member locations. When the network becomes mobilized, these

TABLE 1: **Recycled printing/writing paper mills.**

Company	Mill	Capacity*	Wastepaper content (%)	Grades
Appleton Papers Inc.	West Carrollton, Ohio	122,000 tpy	50	Carbonless
C.P.M. Inc.	Claremont, N.H.	11,440 tpy[1]	50 to 100	Kraft/white envelope, school construction
	East Ryegate, Vt.	17,160 tpy[1]	50 to 100	Envelope, other
Cross Pointe Paper Corp.[2]				
Miami Paper	West Carrollton, Ohio	110,000 tpy	50	Book, text and cover, 25% cotton, opaque
Flambeau Paper	Park Falls, Wis.	133,500 tpy	50	Cover and text
Domtar Inc.	St. Catharines, Ont.	250 tpd	100	Writing, envelope stock
Eastern Fine Paper Inc.	Brewer, Maine	64,000 tpy	50	25% cotton, offset, mimeo, copy
Exton Paper Manufacturers	Modena, Pa.	60 tpd	n.a.	Kraft for envelope, wrapping, etc.
Fox River Paper Corp.	Appleton, Wis.	35,570 tpy	100[3]	Cotton, cover, opaque, typewriter
French Paper Co.	Niles, Mich.	18,000 tpy	50+	Cover and text
Georgia-Pacific Corp.	Gilman, Vt.	71,000 tpy	50	Copy
	Kalamazoo, Mich.	140,000 tpy	50	Copy
P.H. Glatfelter Co.	Neenah, Wis.	135,000 tpy	50	Book, writing, envelope, film-coated offset
IP/Hammermill Papers	Oswego, N.Y.	74,760 tpy	50	Copy
Hopper Paper[4]	Taylorville, Ill.	37,000 tpy	50	Cover and text, writing
	Reading, Pa.	20,000 tpy	50	Cover and text, writing
James River Corp.	Ypsilanti, Mich.	17,800 tpy	50+	Text and cover
JR-Fitchburg	Fitchburg, Mass.	52 tpd	50+	Cover
Kerwin/Riverside	Appleton, Wis.	42,600 tpy	50/92	Writing band, school construction
Lyons Falls Pulp & Paper Inc.	Lyons Falls, N.Y.	76,000 tpy	50	Book, reply card, tablet, forms, specialties
Manistique Papers Inc.	Manistique, Mich.	35,500 tpy	100	Groundwood specialties
Nekoosa Papers Inc.	Nekoosa/Port Edwards, Wis.	160,200 tpy[5]	50**	Copy
Noranda Forest Inc.	Thorold, Ont.	102,000 mtpy	50[6]	Book, forms, copy, envelope, tablet
Potsdam Paper Mills	Potsdam, N.Y.	65,000 tpy	40+	Opaque offset, writing, book
Putney Paper Co.	Putney, Vt.	25,000 tpy	up to 100	MG/MF printing, coated book, ledger, thin
Simpson Paper Co.	Pomona, Calif.	120,000 tpy	25 to 60[7]	Copy
	Ripon, Calif.	39,000 tpy	25 to 60[7]	Copy
	Vicksburg, Mich.	35,000 tpy	25 to 60[7]	Copy
Sorg Paper Co.[8]	Middletown, Ohio	74,750 tpy	50 to 100[9]	Bond, offset, book
Valentine Paper Co.	Lockport, La.	49,840 tpy	50	Offset, tablet, reply card
Ward Paper Co.	Merrill, Wis.	35,000 tpy	100	Watermarked bond, mimeo, duplicator
Watervliet Paper Co.	Watervliet, Mich.	40,000 tpy	50 to 85	Coated and uncoated book offset
Westvaco Corp.	Tyrone, Pa.	87,220 tpy	50	Envelope paper
Geo. A. Whiting Paper Co.	Menasha, Wis.	9,000 tpy	80 average	Cover and text
Cascades/Steinbeis	East Angus, Que. Niagara Falls, N.Y.		Under study	
Champion International Corp.	Hamilton, Ohio		Under study	
Daishowa Forest Products	Port Angeles, Wash., Quebec City, Que.		Under study	
Hyde Park Paper Inc.[10]	Boston, Mass.	55,000 tpy	Closed	Copy, book, offset, cover
Mi Ho Paper	St. Joseph, Mo.		Under study	
Performance Papers Inc.	Kalamazoo, Mich.	250 to 300 tpd	Closed	Book, other

*Tonnage is total mill capacity, except as noted.

**Postcommercial and/or postconsumer wastepaper.

1. Estimated average: Claremont produces 40 tpd and East Ryegate 60 tpd operating five to six days/week.
2. Subsidiary of Pentair Inc.
3. 100% recycled 10 to 15% postconsumer waste.
4. Separate operating company of Georgia-Pacific Corp. Will be using 50% postconsumer in 1990.
5. Less than 50,000 tpy recycled.
6. 5% postconsumer, 45% postcommercial.
7. 25%, 50% and 50% plus 10% postconsumer.
8. Subsidiary of Mosinee Paper Corp.
9. 50 to 100% with 10% postconsumer.
10. Leased from James River; new buyer possible.

Sources: E.H. Pechan & Associates Inc., *Pulp & Paper Week*, *Pulp & Paper Forecaster*.

and other volunteers will become educated on resource issues and will take an active interest in local issues related to recycling and waste management.

The purpose of the network is to help educate the industry while the industry helps educate the public. It is an effort to influence legislation on a local level. Already, many states and municipalities have implemented or are considering strict legislation on recycling and the content of recycled paper (*P&P*, Jan. 1990, p. 39).

NPTA's effort is separate from the approximately $4-million program being implemented by the American Paper Institute this year, though the NPTA also works with API, Buckley says. ■

TABLE 2: **North American recycled newsprint producers.**

Company	Mill	Capacity (metric tpy)	Recycled content (%)	Publisher equity (%)
U.S.				
F.S.C. Paper Co.	Alsip, Ill.	121,500	100	—
Garden State Paper Co.	Garfield, N.J.	199,500	100	Media General Inc. (100%)
Golden State Newsprint Co.	Pomona, Calif.	122,500	100	—
Manistique Papers Inc.	Manistique, Mich.	56,000	100	—
North Pacific Paper Corp.	Longview, Wash.	704,000[1]	25[2]	—
Jefferson Smurfit Corp.	Newberg, Ore.	350,000	50	The Times Mirror Co. (20%)
	Oregon City, Ore.	217,000	50	The Times Mirror Co. (20%)
Southeast Paper Manufacturing Co.	Dublin, Ga.	415,000[3]	95	Cox Enterprises Inc. (33⅓%) Knight-Rider Inc. (33⅓%) Media General Inc. (33⅓%)
Stone Container Corp.	Snowflake, Ariz.	264,100	60	—
Canada				
Atlantic Packaging Corp.	Whitby, Ont.	136,100[4]	100	—
Quebec & Ontario Paper Co.	Thorold, Ont.	310,000	55	Tribune Co. (100%)

Sources: Newsprint Information Committee, *Pulp & Paper Week*.

1. Includes new 230,000-tpy machine starting up in late 1991.
2. Estimated net recycled content among mill's three paper machines.
3. Includes new 215,000-tpy machine started September 1989.
4. New 136,100-tpy machine starting up mid-1990.

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MUNICIPAL SOLID WASTE AND THE PAPER INDUSTRY: THE NEXT FIVE YEARS

Muncipal collection programs are depressing the cost of old newspapers at the same time that consumers are clamoring for recycled fiber

By FRED D. IANNAZZI and RICHARD STRAUSS

The problems associated with disposal of municipal solid waste (MSW)—diminishing landfill capacity, resistance to siting new incinerator capacity, skyrocketing disposal costs—are well known to everyone in the paper industry because the paper industry is always singled out whenever a governmental authority decides that we should "do something" about MSW. The only politically acceptable method of dealing with MSW is source reduction, to be achieved principally by increased recycling. As a result of these public perceptions, a host of laws and directives intended to increase recycling of paper products has been proposed or instituted in the past year, and apparently the flood of legislation is accelerating.

The legislative approaches to reducing MSW incorporate a wide range of incentives and penalties, including targeted percent recycle fiber in specified paper products, mandated reductions in solid waste load, mandated source segregation and collection programs, tax penalty for use of nonrecyclable packaging materials, government-agency purchasing directives requiring a minimum level of recycle fiber in certain paper products, and tax incentives for wastepaper processing facilities and equipment. While some of these initiatives have repeatedly proven to be ineffective or counterproductive, for example, mandating a source segregation program for old newspapers (ONP) without finding a market for the collected product, there is no doubt the legislative activity has captured the attention of the paper industry and prompted some very useful and statesman-like actions on the part of the industry. This article reviews the current status of recycling of paper products and projects what is likely to happen to wastepaper recovery and recycling in the next five years.

HOW BIG IS THE WASTEPAPER PROBLEM? The logical place to start an analysis of the present and future state of paper recycling, in the context of the MSW problem, is to present statistics on the magnitude of MSW and the relative fraction that paper products contribute to it. Unfortunately, good statistics on MSW and its composition are remarkably hard to come by. For example, the report "Facing America's Trash: What Next for Municipal Solid Waste?" produced by the U.S. Office of Technology Assessment (October 1989), cites per capita generation of MSW in selected cities ranging from 1.9 lb/day (Yakima, Wash.) to 9.4 lb/day (Chattanooga, Tenn.), a *five fold* variation. Similarly, in 49 studies of the composition of MSW, the estimated percentage of total paper in MSW ranged from 29.9% to 54.7%.

The figures most often quoted, apparently "consensus" figures, are 3.6 lb/day per capita for total MSW generation, with a paper content of 40%. Using these figures, the annual U.S. totals are then about 160 million tons of MSW, containing about 63 million tons of paper. To illustrate the uncertainty in these estimates—even if we hold the total MSW figure at 160 million tons—a difference of 30% to 50% in the paper content would pro-

TABLE 1: **Disposition of paper products in U.S. (million tons).**

Potentially recyclable paper products	U.S. consumption	Recovery for reuse and export	% recovery	Disposed in MSW
Newsprint (ONP)	13.7	4.5	33	9.2
Magazines and inserts/supplements (OMG)	6.4	Negative	Negative	6.4
Printing and writing (P & W), less OMG	17.5	8.5	49	7.0[1]
Old corrugated containers (OCC)	22.9	11.8	52	11.1
Other packaging	7.4	Negative	Negative	7.4
All other disposable paper and board[2]	11.9	Negative	Negative	11.9
Totals	**79.8**	**24.8**	**31.1**	**53.0**

1. About 2.0 disappears in permanent records.
2. Not including tissue.
Source: A.I.A.

Mr. Iannazzi is president, and Mr. Strauss is senior consultant, Andover International Associates, Danvers, Mass.

duce a paper loading in MSW ranging from 48 million tons to 80 million tons. With much variability inherent in these numbers, it would be impractical to use them as either a basis for setting target reductions or a means for monitoring achievements of targets.

A better method of determining the paper contribution to the MSW load is to build up the figures from the statistics for the major grades of paper. Based on data from the American Paper Institute (API) and the U.S. Dept. of Commerce, Andover International Associates (AIA) has compiled the totals (Table 1). We can now examine the major grades individually and project what is likely to happen in the next five years to the quantity of each of the grades in MSW.

OLD CORRUGATED CONTAINERS (OCC). OCC, in common with some other wastepaper grades, is peculiar in that its rate of demand (consumption in medium and liner) is dependent on its rate of supply (production of corrugated containers). This cyclic situation is best illustrated by Figure 1, a format develped by AIA. Of the U.S. consumption of 22.9 million tons, 11.8 million tons (51%) were recovered for recycling or export and 11.1 million tons ended up in the MSW stream. Because some of the recovered OCC is used for products other than liner and medium and because some OCC and linerboard are exported, the recycle fiber content in U.S. corrugated containers was only about 25%, even though the recovery of OCC was 51%. Too often in discussions of possible legislative action to alleviate MSW load, the percent recycle fiber and percent recovery are considered to be synonymous.

What should be done to stimulate increased recovery of OCC? The short answer: nothing. OCC is in rather short supply at present, and we project it will become even tighter in the future. Even though the consumption of corrugated containers is expected to increase by 4.3 million tons (19%) from 1988 to 1995, the OCC load in MSW is projected to decrease by 2.3 million tons over that same period because of the forecast increase in OCC pulping capacity (Table 2). At the projected 1995 recovery rate of 68%, OCC will be in short supply indeed. Although the recovery rate will not have reached the practical limit, which we estimate to be about 75% to 80%, it will be close enough for the OCC market to be a sellers' market. There is no reason to impose incentives or penalties on OCC recovery or reuse to reduce its presence in the MSW stream. Existing market forces will do the job nicely.

ONP AND OLD MAGAZINES. On the face of it, the picture for increased recycling of ONP looks rather bleak (Figure 2). For more than ten years, the recovery rate has held at 30% to 33%, and since the newsprint industry is currently overbuilt, there seems to be no compelling reason for producers to install new deinking capacity. Moreover, despite continuing research efforts, there is no present or potential application for ONP other than newsprint that offers any significant opportunity for growth. The fallout from the MSW crisis, however, has completely changed the operating parameters of the newsprint industry. Now there is good evidence for the view that the demand for ONP will rise dramatically in the next few years so that by the end of the decade the demand will be challenging the limits of supply.

The newsprint industry has felt the impact of the MSW problem in two areas of its business:

1. New laws in Connecticut, California, and other states have set progressively increasing targets for recycle fiber in newsprint. Although the existing state laws are inconsistent and some are probably unworkable, it is clear to many newsprint producers that some set of minimum recycle fiber standards will be adopted and that it will be necessary in the future to have ONP deinking capacity in order to be able to sell newsprint.

2. The good news of the MSW crisis is that it has had, and will continue to have, a depressing effect on the cost of ONP to the newsprint producers. The disappearance of

FIGURE 1: **U.S. supply and disposal of corrugated containers.**

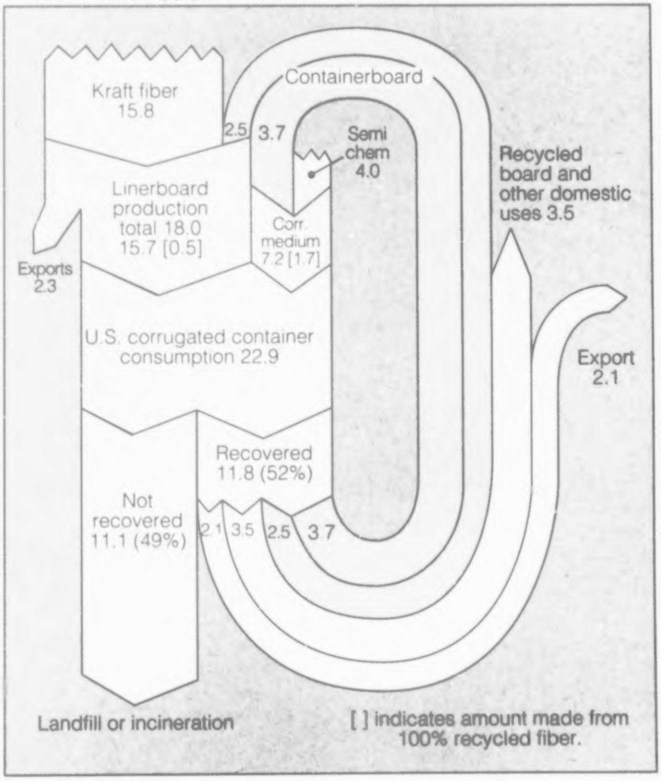


TABLE 2: **The OCC load in MSW is expected to decrease by 2.3 million tons from 1988 to 1995.**

OCC (mm tons)	U.S. consumption	Recovery for reuse and export	% recovery	Disposed in MSW
1983	18.4	8.4	46	10.0
1988	22.9	11.8	52	11.1
1995	27.2	18.4	68	8.8

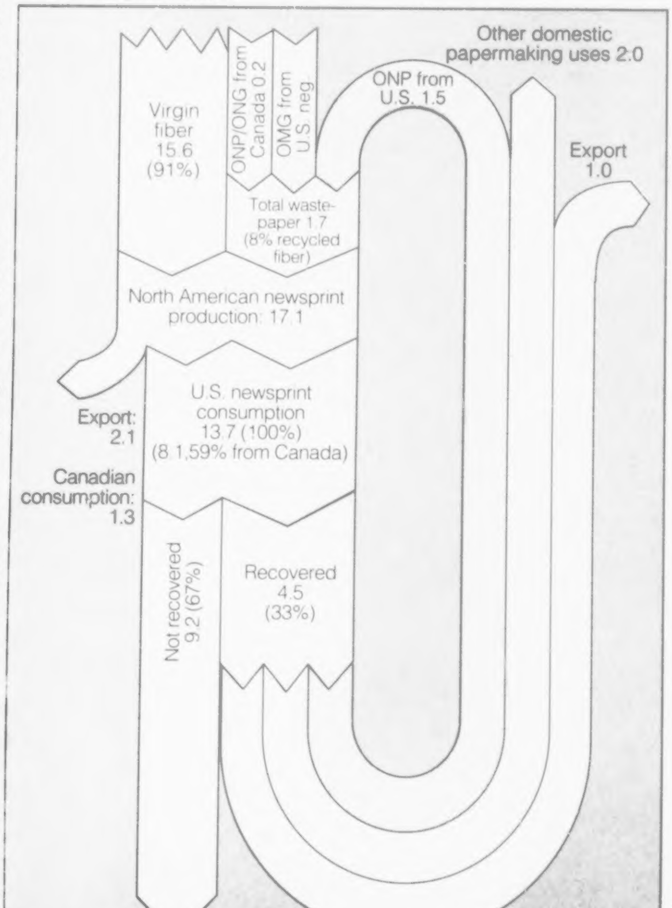
landfill capacity has driven the price of MSW disposal to an average of about $60/ton in the Northeast, and the prospect is for continued escalation of disposal costs in all areas of the country. Many municipalities have instituted segregation and curbside collection of ONP simply to avoid having to pay to dispose of it, and they are willing to pay anything less than the prevailing tipping fee to have it removed. In effect, the tipping fee (avoided cost) is subtracted from the collection/sorting/baling/transport costs (incurred costs) to arrive at the price for ONP delivered to the deinking facility. When priced on this basis, ONP becomes an economically attractive alternative to virgin pulp, in many cases even if a new deinking facility displaces an existing thermomechanical pulp facility.

To determine quantitatively what effect the new market conditions will have on ONP recovery, we must select for analysis one set of recycle fiber targets from among the many that have been legislated or proposed. We will use the recently announced New York State standards because New York standards will necessarily be influential in the industry. AIA worked with New York to assist in developing these standards. The New York standards for percent recycle fiber content in newsprint and the corresponding recovery rates calculated by AIA are shown in Table 3.

The limit on the rate of increase in recycle fiber content is the rate at which new deinking capacity can be built. Our estimate is that the deinking capacity will, in fact, be in place slightly faster than the New York schedule requires. Although at present the potential ONP supply far exceeds demand, when 65% recovery is required the demand will press the limit of practical recovery. We conclude that the mechanism is already in place to achieve the maximum possible reduction of the ONP load in MSW. What is now required is to standardize recycle fiber targets in newsprint and to maintain consistent legislative policies for the next several years.

It is interesting to note that the newer ONP deinking processes not only permit but also benefit from an admixture of about 1:2 old magazines (OMG) to ONP. By the year 2000, if the 65% recovery of ONP is achieved, about 5.5 million tons of OMG will be required in ONP deinking, over half the OMG potentially available at that time. Thus, the new conditions imposed on the ONP market will greatly reduce the OMG load in MSW.

FIGURE 2: **North American supply and disposition of newsprint—1988.**


Other domestic papermaking uses 2.0
ONP/ONG from Canada 0.2
OMG from U.S. neg.
ONP from U.S. 1.5
Virgin fiber 15.6 (91%)
Export 1.0
Total wastepaper 1.7 (8% recycled fiber)
North American newsprint production: 17.1
Export: 2.1
U.S. newsprint consumption 13.7 (100%) (8.1,59% from Canada)
Canadian consumption: 1.3
Not recovered 9.2 (67%)
Recovered 4.5 (33%)

PRINTING AND WRITING PAPER. Used printing and writing (P&W) paper, a major contributor to the MSW load, if properly segregated, is a valuable product for which ample profitable markets exist. Paradoxically, this is the one major wastepaper stream for which no organized program in hand will significantly reduce the load in MSW. Problems inhibit recovery of this potentially valuable resource:

1. In contrast with ONP, for example, the P&W paper feedstock is extremely varied in composition. The major grade classifications that comprise P&W include uncoated free-sheet, coated free-sheet, bleached bristol, coated groundwood, and uncoated groundwood. Within these major categories are many subcategories that must be monitored during storing and segregation to obtain the highest-value recycle paper.

2. For maximum utilization, the wastepaper must be collected and segregated into relatively uniform feedstocks. The paper is presently classified in three major wastepaper grades: pulp substitutes, high-grade deinking, and mixed. Within each of these major grades are multiple subdivisions recognized by the wastepaper industry. For example, API has four grades within the pulp substitutes and high-grade deinking categories, and the Paper Stock Institute of America further subdivides these four grades into 23 codes.

3. Compared with ONP and OCC, wastepaper originating from P&W grades is generated in low concentrations

TABLE 3: **New York State targets for recycle fiber content in newsprint.**

Year	N.Y. target recycle fiber content	ONP recovery rate calculated by A.I.A.
1992	11%	35%
1995	23%	43%
1997	31%	54%
2000	40%	65%

at scattered sites, many of which would be too small to justify pickup by wastepaper processors.

As a result of these multiple difficulties, the wastepaper industry has traditionally concentrated on recovery and reuse of the most accessible of the waste P&W paper: the preconsumer converter waste. This paper is usually found in high concentrations from identifiable sources and is clean and well segregated. Little postconsumer office waste is recovered at present, and postconsumer P&W household waste is essentially unrecovered.

There are now signs that the MSW crisis will begin to affect the recovery of P&W paper just as it has affected recovery of ONP. However, because of the fragmented nature of the supply, generation, and utilization of P&W paper, no single action could be taken by government or industry that would significantly increase utilization of this wastepaper. Rather, a series of actions by both government and industry will be required to alleviate the load of used P&W paper in MSW, and we believe that we will begin to see significant progress in the next few years in achieving this objective.

We see ahead developments that will lead to evolutionary—not revolutionary—progress in reducing the P&W load in MSW:

1. Much more prevalent office waste segregation programs, impelled both by the wish to avoid escalating disposal fees and the genuine desire on the part of the environmentalists (that is to say, everyone) to conserve scarce landfill capacity.

2. Implementation by municipalities and/or wastepaper dealers of systems for collecting small quantities of segregated office waste from scattered sites and concentrating them in central dropoff points.

3. Implementation by municipalities and/or wastepaper dealers of systems for collecting small quantities of segregated household fine paper waste, in conjunction with established programs for curbside collection.

4. Improved programs by wastepaper dealers to collect segregated fine paper from dropoff points, leading to more efficient and economical collection and processing of multiple grades.

5. Improved sorting and contaminant-removal processes at wastepaper handling sites.

6. Improved deinking/pulping processes that would be more tolerant of mixed feedstocks (like the newer ONP deinking process that permit high OMG content).

7. Increasing imposition of purchasing specifications by government agencies and others requiring a minimum recycle fiber content in specified products.

8. Increasing attention by government authorities and industry participants to reducing or eliminating fiber mixtures or converting additives that inhibit fiber reuse.

9. Increasing recognition by the paper industry that the market will actually favor a product with significant recycle content, even if qualities such as brightness or contaminant content are not equivalent to paper made from virgin pulp. ■

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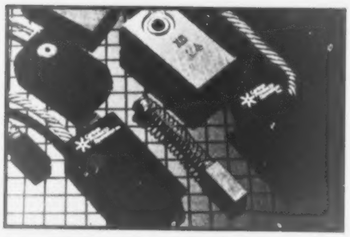

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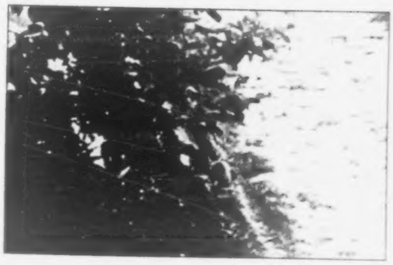

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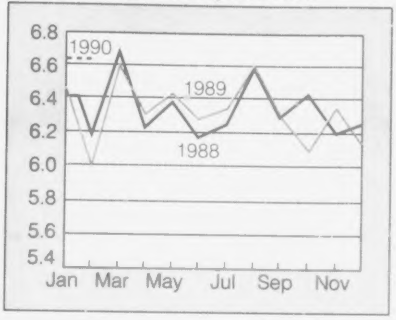
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.6 million tons in January, an increase of 2.2% over a year earlier, according to the American Paper Institute. Paper production for the month was at a seasonally adjusted annual rate of 39.3 million tpy, up 1.6% from the previous year. The seasonally adjusted rate for paperboard dipped to 38.1 million tpy, down 0.7% compared with January 1989.

Among major grades, newsprint production was up almost 10% in January, reflecting capacity additions from two new mills started up last fall. The trend rate for printing and writing paper continued flat, up 0.9% for the month to an annual rate of 22.8 million tpy. Growth of 8% to 9% in paperboard production for export was offset by a 2.2% decline in boxboard production for domestic use and just 0.2% growth in containerboard output for the U.S. market. Fiber box shipments were 1.3% lower in January than a year earlier, after adjusting for an extra day. ■

Canadian newsprint shipments totaled 715,000 metric tons in January, down 5.2% from a year earlier. Woodpulp shipments declined 3.9% to 613,000 tons. Operating rates stood at 92% for newsprint and 93% for woodpulp. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Jan.	556	9.7	6,671	9.6
Uncoated groundwood (s)	Jan.	157	6.1	1,889	5.3
Coated paper (s)	Jan.	638	0.8	7,654	0.6
Uncoated free-sheet (s)	Jan.	972	1.0	11,662	0.7
Other printing/writing	Jan.	131	3.1	1,573	6.0
Total packaging and other paper (s)	Jan.	414	-9.0	4,970	-6.4
Tissue	Jan.	490	5.2	5,882	5.2
Total paper	**Jan.**	**3,358**	**1.9**	**40,300**	**1.9**
Unbleached kraft paperboard	Jan.	1,685	1.9	20,225	1.7
Semichemical medium	Jan.	490	-2.6	5,874	-2.0
Bleached paperboard	Jan.	384	1.3	4,613	0.0
Recycled paperboard	Jan.	725	-3.3	8,702	-2.9
Total paperboard	**Jan.**	**3,285**	**0.0**	**39,414**	**-0.1**
Total U.S. paper and paperboard output	**Jan.**	**6,643**	**2.2**	**79,714**	**0.9**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Dec.	4,969	-5.9	62,023	1.4
Market pulp production	Dec.	648	-16.2	8,664	1.2
Wastepaper consumption at paper/board mills	Dec.	1,593	4.4	19,994	5.1
Pulpwood consumption (cords)	Dec.	7,936	-3.2	98,414	3.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Jan.	27.462	3.5	27.462[6]	3.5
Containerboard inventories at U.S. box plants and mills	Jan. 1	2,501	-2.0		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Dec.	1,006	26.7	12,910	1.0
Imports of Canadian newsprint	Dec.	669	27.9	8,331[6]	n.c.
U.S. paper exports (including products)	Dec.	511	4.3	6,264	12.7
Exports of unbleached kraft linerboard	Dec.	197	6.5	2,217	3.6
Exports of woodpulp	Dec.	585	2.1	6,231	12.7
Norscan pulp inventories[4]	Jan. 31	1,422	62.7		
Norscan pulp operating rates[4]	Jan.	98%	86%	93%	92%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Jan.	715	-5.2	715[6]	-5.2
Operating rates	Jan.	92%	99%	92%	99%
Inventories held by U.S. consumers	Jan. 31	971	1.6		
Other paper/board shipments	Jan.	612	9.7	612	9.7
Woodpulp shipments (export only)	Jan.	613	-3.9	613	-3.9
Operating rates	Jan.	93%	89%	93%	89%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

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Uncoated free-sheet: Severe price discounting moderates as market demand improves

Grade structure: No more than 10% mechanical pulp is used to make uncoated free-sheet (wood-free) paper. The balance is chemical (kraft) woodpulp. Excluded are uncoated groundwood, cotton fiber, bristols, and thin paper. Major end uses include business paper, such as stationery, reprographic, forms bond, tablet, and envelope, plus printing paper, such as offset, cover and text, and miscellaneous (such as technical, papeterie, or colored school).

Perhaps 50% to 60% of uncoated mills have converted to alkaline sizing to improve cost structure as well as provide longer lasting paper. Another trend has been bolstered by the solid waste management crisis. More than 30 companies have introduced recycled printing and writing grades, most based on preconsumer waste, though some mills use 10% to 20% deinked (or even nondeinked) postconsumer waste. Grades include copy and forms bond, stationery, cover and text, specialty paper and other office/school paper, and envelope paper.

Canadian mills have been increasing their role in this market, jumping from nearly no uncoated free-sheet a few years ago to just under 1.7 million short tons in 1990.

Production/capacity: At least half of the uncoated white paper produced in North America is converted into "business paper" for such uses as computer printers and copiers and single and multipart forms.

Overcapacity, high customer inventories, and an economic slowdown all contributed to a 2.1% decline in U.S. uncoated free-sheet production in 1989 compared with 1988. However, industry estimates call for a 5.0% increase in 1990. U.S. capacity will increase about 2.1% in 1989, according to the American Paper Institute.

New Canadian capacity (about 1.5 million tons) pushed up production levels by 14.6% in 1989 and will probably grow another 14.0% in 1990. Capacity will increase about 14.8% in 1990, according to the Canadian Pulp & Paper Assn. New capacity online in 1990 includes Willamette Industries Inc.'s greenfield mill in Bennettsville, S.C., (255,000 tpy) plus incremental increases at Great Northern Nekoosa Corp. in Ashdown, Ark., (80,000 tpy); Union Camp Corp. at Eastover, S.C. (50,000 tpy); and 58,000 tpy at Champion International's Quinnesec, Mich., mill.

Boise Cascade Corp. will start up its new 308,000-tpy machine at International Falls, Minn., in 1991, as will GNN at Ashdown (325,000 tpy), and Union Camp (240,000 tpy).

An additional 680,000 tpy will be added in 1992.

Outlook: These situations also caused weaker U.S. operating rates: about 91% in 1989 and possibly 93% in 1990. Canadian operating rates are pegged at 89% in 1988, 80% in 1989, and probably 80% in 1990.

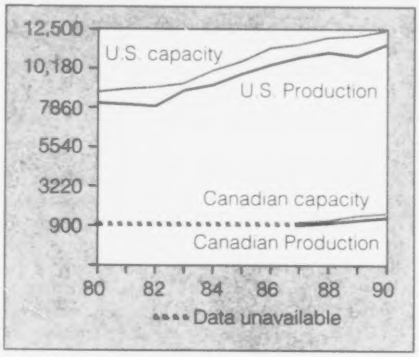
Demand should remain stable through the end of 1990. Imports are expected to remain even or decrease slightly this year.

Pricing: Mills announced price increases on forms, cut-size, and envelope paper to take effect in first- and second-quarter 1990. However, they were raising the published transaction prices rather than list prices. Market weakness had caused severe discounting in almost all grades (sometimes more than $100/ton) during 1989.

Price trends for two important grades are (year-end, $/short ton, list), book paper, No. 3 offset, 45-lb sheets: 1984, $880; 1985, $800; 1986, $850; 1987, $850; 1988, $1,020; 1989, $940. Forms bond, 15-lb rolls: 1984, $680; 1985, $600; 1986, $620; 1987, $760; 1988, $910; $830-860.

Markets: Subgrade market shares in 1990 (approximate): bond and reprographic—27%; mimeo and duplicating (MDX)—0.4%; forms—20%; offset printing—24%; envelope—11%; tablet—3%; carbonless—7%; other—7.6%.

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	**1988**[3]	**1989**[3]	**1990e**
Production[1]	11,277	11,043	11,595
Capacity[1]	11,853	12,149	12,403
Utilization rate	95%	91%	93%
Imports	592	586	580
Exports	83	100	118
Apparent U.S. consumption	11,786	11,529	12,057
lb/capita	26.48	27.08	28.32
GNP ratio	1.62	1.63	1.68
Canada			
Production[2]	1,023	1,172	1,336
Capacity[2]	1,153	1,457	1,672
Utilization rate	89%	80%	80%
Exports[2,4]	284	422	510
Canadian consumption[2]	728	707	734

e = *P & P* Estimate.

1. American Paper Institute; 1990 - *P & P* estimate. **2.** Canadian Pulp & Paper Assn. for 1988 & 1989. **3.** Revised. **4.** Over 90% shipped to U.S.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 short tpy)	**Market share (%)**
1. International Paper	2,100	14.9
2. Georgia-Pacific/GNN[1]	1,970	14.0
3. Champion International	1,114	7.9
4. Boise Cascade	910	6.5
5. James River[2]	872	6.2
6. Weyerhaeuser[3]	807	5.7
7. Union Camp	800	5.7
8. Mead Corp.[4]	520	3.7
9. Simpson Paper	450	3.2
10. P.H. Glatfelter	420	3.0
11. Domtar	350	2.5
12. Canadian Pacific	175	1.2

Market share of top five companies: **49.5%**
Market share of top ten companies: **70.8%**
Total North American capacity/yr
(1990—000 short tons):**14,075**
Canada (est.): **1.672 short tons** U.S.: **12.403**
million tons

1. GNN agreed to buyout by G-P in February.
2. *P & P* estimate. **3.** Includes Prince Albert, Sask.
4. Includes carbonless basestock.
Sources: Company data; *P & P* estimates.

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SALES AND EARNINGS

Canadian industry profits tumble in 1989

Canadian pulp and paper company profits plummeted 65% in fourth-quarter 1989 from a year earlier and were down 31.6% for all of 1989, according to a *Pulp & Paper Week* survey of results from 17 companies. This followed a 37% profit slide in the third quarter from a year earlier. The culprits continued to be a stronger Canadian dollar, weak newsprint markets, and higher wood costs in British Columbia. The Canadian dollar was about 4% stronger last year, averaging approximately US$0.85 to the Canadian dollar in 1989, compared with US$0.81 in 1988.

Most West Coast producers suffered less than their eastern counterparts, mainly because the pulp market remained firm through the year (at least for northern bleached softwood kraft). But the industry is bracing for further hard times, with pulp prices beginning to weaken and difficult labor negotiations slated for this month in eastern Canada. However, a few executives expressed hope that the rising Canadian dollar had finally begun to reverse and that newsprint prices were as close to the bottom as they would get.

Abitibi-Price Inc. suffered a 72% drop in profit on 1989 sales of $3.2 billion, down 1.4% from 1988. Included in the earnings report was a write-off of assets withdrawn, or about to be withdrawn, from production and employee severance costs related to restructuring. Before this C$31.2-million charge before taxes, net earnings would have been C$6.5 million for the fourth quarter, the company said. Newsprint sales were down 7% from 1988, and declining transaction prices offset a positive cost performance from the company's mills. The company announced a price hike for newsprint in February, although it is expecting 1990 to bring continued weak earnings for newsprint and groundwood paper. Abitibi does expect a rebound this year for coated paper.

Canadian Pacific Forest Products Ltd. cited weak markets in white paper, paperboard, and packaging products for a 32% slide in profits for 1989. CEO Cecil S. Flenniken said weakness in those markets and in newsprint was partially offset by continued strong demand in the pulp sector.

Not all companies suffered. Despite deterioration in the fine paper and market pulp areas during the second half, Domtar Inc. said operating profits for these businesses improved.

Canadian paper industry results.

	Fourth-quarter 1989 (C$000)				Full year 1989 (C$000)			
Companies	**Sales**	**Change %**	**Earnings**	**Change %**	**Sales**	**Change %**	**Earnings[1]**	**Change %**
Abitibi-Price Inc.	$800,900	−6.4%	$ (14,500)	nm	$3,257,700	−1.4%	$54,200	−71.6%
Canadian Pacific Forest Products Ltd.	na	na	na	na	2,900,000	−3.3	220,100	31.9
Canfor Corp.	242,400	0.7	13,900	−32.5	921,200	−15.0	96,400	−5.1
Cascades Inc.	175,787	17.1	3,431	−43.2	681,603	15.8	29,887	−27.3
Doman	166,585	nm	7,855	nm	485,753	60.6	31,887	57.6
Domtar Inc.	596,000	−6.4	(27,000)	nm	2,515,000	0.6	33,000	−70.3
Donohue Inc.	154,691	−10.4	9,237	−49.5	641,472	−1.1	44,250	−35.6
Fletcher Challenge Ltd.	341,700	−7.8	19,900	−56.6	1,402,800	−4.7	120,000	−33.4
MacMillan Bloedel Ltd.	786,700	−1.8	39,600	−45.9	3,273,700	0.0	246,700	−25.2
Malette Kraft[2] Pulp & Power	39,129	20.9	6,147	−2.0	—	—	—	—
Noranda Forest Inc.	1,252,000	7.9	27,000	−57.1	4,923,000	3.3	189,000	−28.1
Repap Enterprises Inc.	353,100	34.3	26,700	−11.3	1,221,800	18.8	93,100	0.3
Rolland Inc.	99,329	−10.3	(3,094)	nm	438,380	−1.5	(5,156)	nm
Scott Paper Ltd.	na	na	na	na	436,017	39.2	17,969	10.6
Tembec Inc.[2]	57,819	−3.4	6,067	−19.4	—	—	—	—
Weldwood of Canada Ltd.	177,400	−17.7	9,800	16.7	767,600	−14.2	65,400	5.5
West Fraser Timber	na	na	5,000	−15.3	550,000	18.8	28,400	−29.5
Total	**$5,243,540**	**2.0%**	**$125,043**	**−64.7%**	**$20,966,025**	**1.7%**	**$1,236,737**	**−31.6%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. First-quarter results ending Dec. 31. ( ) = losses. nm = Not meaningful. na = Not available.

Abitibi: Includes a C$31.2 million pretax charge from restructuring. **Canfor:** The company said 1988 and 1989 sales figures are not directly comparable because of changes resulting from the formation of Howe Sound Pulp & Paper Ltd. and Canfor-Weldwood Distribution Ltd., and the acquisition of Balfour Forest Products Inc. in mid-1989. **Doman:** Includes results of Western Forest Products Ltd. and Western Pulp Ltd. partnership from July 1. **Domtar:** Includes a C$35 million corporate restructuring charge and also reflects discontinued operations. **Fletcher Challenge Canada:** Total before extraordinary items, which include restructuring costs and writedown of Grande Cache, Alta., sawmill investment, offset by a gain on the sale of Western Forest Products Ltd. and tax credits. **Noranda Forest:** Results of Normick Perron are included for the last four months of 1989. **Rolland:** Includes writedown resulting from restructuring of the Mont-Rolland operations. **Tembec:** Unaudited results including recovery of income tax on prior-period losses.

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though overall income tumbled 70% for 1989. Although profits fell 36% from last year, Donohue Inc. reported that net earnings of C$44.2 million was the second highest level ever achieved in the history of the Quebecor subsidiary. Fourth-quarter earnings were down 50%.

Citing firm pulp prices and increased coated paper shipment, Repap Enterprises Inc. reported a new high for revenues, up 34% for the fourth quarter and 19% for the year. Profits were up 0.3% to C$93.1 million for 1989. Nonintegrated fine paper producer Rolland Inc. saw a net loss of C$9.6 million after extraordinary items, citing the higher pulp costs.

MacMillan Bloedel Ltd. CEO Ray Smith called the company's 1989 earnings of $246.7 million "a good solid performance for the year." MB saw no change in annual sales from 1988 while watching profits drop 25% on the year and 46% for the quarter. The earnings reflect a strong pulp market and good results from lumber and containerboard, the company said.

Noranda Forest Inc. saw a 3.3% sales increase to C$5 billion. Earnings of C$189 million were down 28% on the year and 57% for the fourth quarter.

Fletcher Challenge Canada Ltd.'s net earnings were reduced by over $25 million by the Canadian dollar, the company said, as it finished 1989 57% below last year's fourth quarter and down 33% in profits for the year. FC also cited reduced newsprint prices and production interruptions related to modernization and expansion projects at mills in Minnesota and British Columbia as causes for the slide.

Fletcher's CEO Ian Donald said that he expects 1990 to be a difficult year, with some encouraging developments. With Blandin's new No. 6 paper machine coming up to capacity, "significantly increased volumes of lightweight coated paper will be produced during the year," he said. "Increased pulp production should also be achieved, as capital projects near completion."

Downtime and production problems at pulp and paper operations were reasons cited by Canfor Corp. for a fourth-quarter decline of 32.5%. Market pulp demand was strong throughout the year, the company said, but sack kraft markets weakened during the second half, and protracted startup problems at recently modernized sawmills seriously cut into wood products earnings. ■

MARKET PULP

Logging company plans CPGW market pulp mill

Orenda Forest Products Ltd. said it plans to build a new type of mechanical market pulp mill at a tidewater site near Stewart, B.C., for about C$144 million. The proposed mill will use a Tampella closed-loop, chemipressurized groundwood (CPGW) system that will place the mill among the most efficient and environmentally sound pulp operations in the world, the company said. Financing for the proposal is "under negotiations," said president and CEO Hugh Cooper from the firm's offices in West Vancouver, B.C.

The mill will be capable of producing 300 tpd of machine-dried pulp mainly for export to the Pacific Rim and for use in supercalendered and lightweight coated paper. The pulp is expected to have a freeness of 60 CSf and 75 brightness and "will fill a market not being served by flash-dried CTMP market pulps," according to a Tampella executive. In addition, he noted, the closed loop mill will have zero effluent.

The CPGW system will use alkaline peroxide in the grinder hot loop to achieve first-stage bleaching, which will be followed by a second bleaching stage. A similar CPGW system was recently started up at Niagara of Wisconsin, and about four other integrated U.S. printing/writing paper mills have installed regular PGW systems in recent years. H.D. Reins & Associates of Oregon City, Ore., will provide consulting engineering for the British Columbia project.

Orenda said the process also allows the mill to use short-length pulp logs. Because of the increased efficiency and handling capabilities expected at the Orenda mill, more saw logs could be salvaged and less timber will be left on the ground. Under terms of a renewable 20-year forest license, Orenda holds timber rights to about 250,000 acres of decadent woodlands in the Kalum timber supply area of northwestern British Columbia. To ensure necessary fiber supply for the planned pulp mill, Orenda has prepared an application for an additional 100,000 m³ of annual quota.

Orenda Forest Products, a Vancouver Stock Exchange-listed company formerly known as Asitka Resources Corp., originally proposed to build a 700-tpd thermomechanical market pulp mill. ■

MB says Alberni pulp mill in "jeopardy"

MacMillan Bloedel Ltd. told employees recently that its Port Alberni, B.C., kraft pulp mill is in "serious jeopardy" due to a combination of land use threats, anticipated capital requirements of $120 million to meet environmental standards over the next two years, and changing market conditions.

"Barring unexpected changes, we will have to discontinue our bleaching operations before 1992, when new regulations regarding chlorinated organics become effective," MB Alberni region vice president Dale Tuckey said.

The kraft mill, which employs about 200 people, has operated since 1947. It is comparatively small, producing about 500 tpd of unbleached and semibleached kraft pulp.

Tuckey said the company thought it had a solution last year in the planned conversion of the mill to production of fully bleached kraft pulp. Several factors, however, now appear to make that plan untenable, he said. Foremost among those factors is the $120 million that would be required for the mill to meet pollution standards that will be in effect by 1992.

The other major factor is uncertainty about the fiber supply in the Alberni region. About one third of the region's annual allowable cut is in dispute, with the looming possibility of substantial withdrawals.

As a result, MB has decided to place a hold on the $120-million investment, which mainly affects the bleach plant supplying semibleached kraft pulp to the mill's newsprint machines. The company has told customers that no decision has been made concerning the future of the kraft mill or production of market unbleached kraft pulp. ■

NEWSPRINT

Bowater approves deinking plant

Bowater Inc.'s directors have approved construction of a new newsprint deinking plant adjacent to its Calhoun, Tenn., newsprint mill. The new plant is expected to cost about $75 million and will supply 300 short tpd of recycled fiber to Bowater's existing newsprint mill.

The company originally had announced plans to install an old newspaper (ONP) recycling facility at one of its mills in mid-1989, and preliminary engineering was started in September. Studies found the Tennessee mill was the best location to site a first recycling operation. Additionally, the study established that the best economies of scale lay in a single, nonexpandable line to which additional lines can be added in the future.

According to the company, the 300 tpd of recycled pulp will allow the Calhoun mill, which has an annual newsprint capacity of 790,000 tons, to market up to one third of its productive capacity as newsprint that meets the federal government's definition of 40% recycled content. Greater volumes of recycled ONP will be available if the blend percentage averages less than 40%, the company said.

The plant will use both washing and flotation systems of deinking to process ONP printed with letterpress, offset, or flexographic inks. It will also recycle some coated magazine stock to deliver a pulp blend of about 70% old newsprint and 30% old magazines. Startup is set for December 1991. ■

Stone plans Canadian recycled newsprint machine

Stone-Consolidated Inc., a unit of Stone Container Corp., said in March the company intends to have recycled newsprint capacity in Canada by the end of 1991. This will not result in a short-term capacity increase, a statement said. Management has not yet determined a specific site nor a specific capacity. The company makes newsprint at Port Alfred, Shawinigan Falls, and Grand'Mére, Que.

Over 44% of Stone's 1.3 million metric tons of newsprint capacity is already made from recycled fiber. The company uses substantial quantities of recycled fiber at its Snowflake, Ariz., and Ellesmere Port, U.K., newsprint mills. Increased capacity and other issues have delayed some other Canadian recycled newsprint projects, though U.S. mills plan to move ahead with their plans. ■

WASTEPAPER

API sets recycling goal, releases key study

The American Paper Institute announced late in February a new national recycling goal for the industry. By 1995, noted API, U.S. mills aim to recover and reuse 40% of all the paper consumed in the U.S. API also released key findings of a study on wastepaper supply/demand trends through 1995 done for the association by Franklin Associates Ltd. The report indicated, among other things, that achieving a 40% recycling goal by 1995 will bring collection rates for the major wastepaper grades (other than mixed paper) to what may be their practical maximum levels.

"Reaching this goal is dependent on recovering 40 million tons of wastepaper in 1995, a 50% increase over 1988 levels," noted Red Cavaney, president of API. "It will require the cooperation of the public sector, and the participation of tens of millions of citizens, in order to expand collection systems."

Wastepaper supply will be the principal limitation to ongoing growth in the rate of wastepaper consumed after 1995, the Franklin report said. In five years, the combination of wastepaper demand in the U.S. paper industry, exports, and all other uses will lead to consumption of all wastepaper that can be reasonably recovered in usable condition, except for mixed paper.

Franklin projects a U.S. recovery rate in 1995 of 38.5% to 41.7% of new supply, which will generate enough recyclable paper to balance projected demand. Practical maximum recovery rates by major grade category are estimated at 63% to 68% for corrugated, 50% to 55% for newsprint, 50% for high-grade deinking paper, 100% for pulp substitutes, and 15% to 25% for mixed paper.

Promoting public recycling efforts. API also is creating a national database system, MatchMaker, to help communities that have wastepaper to sell or want to set up recycling programs and identify recycling mills and wastepaper dealers. This will include the development of a national paper recycling directory. In addition, the association will sponsor a national public education program to promote recycling awareness and the collection of high-grade wastepaper, sorted by grade, and will develop "how-to" tools dealing with source separation and collection programs.

Over the next three years, API expects wastepaper consumption by U.S. paper mills to grow at twice the rate of virgin fiber. Thirty-seven expansions, including eight new mills that involve wastepaper furnish, are currently being built or have been announced. Many more projects are in the planning stages, according to API.

Substantial deinking investment. North American newsprint producers have been the biggest spenders on recycling capacity in recent months. An estimated $1.1 billion will be invested through 1995 to install deinking capacity. Consumption of old newspapers (ONP) by this sector alone is expected to increase by over 1 million tons between 1988 and 1995, a 71% jump during that period. API expects that the projected increase in Canadian recycled newsprint capacity will account for at least 700,000 tons of ONP exports from the U.S. by 1995.

The recovery of old corrugated containers (OCC) is expected to reach 18.8 million tons in 1995, compared with 12.4 million tons in 1988, a 51.6% hike. Over the same period, growth in containerboard new supply will increase at less than half that rate, 19.8%. The recovery of OCC will be approaching its limits of 60% to 65% by 1995 using present techniques, noted the Franklin report.

Pulp substitutes, on the other hand, are already constrained, while the demand for these prime wastepaper grades is virtually unlimited. "The projection of demand can be construed to be at 100% recovery," noted Franklin. In 1988, recovery was 3.5 million tons; by 1995, recovery will be at an estimated 4.0 million tons.

Deinking grades are in high demand and in limited supply as well, although there is potential to upgrade mixed paper to a deinking grade by labor or mechanical means. In 1988, the recovery of high-grade deinking paper was 2.6 million tons; in 1995, the recovery is projected at 4.4 million tons, or 50% of the available supply.

The nation's potential ability to collect mixed paper, on the other hand, will probably exceed the ability to use and export these grades by 1995, noted Franklin. Wastepaper exports would reach 11 to 14.2 million tons by 1995, assuming that the growth in paper and paperboard consumption in the rest of the world is at least 2.5% a year from 1988 to 1995, according to Franklin's projections. The average recovery rate for all countries other than the U.S. will edge up from 35.3% in 1988 to about 36% in 1995. ■

New York projects 65% recycling rate

A report recently released by the New York State Newspaper Recycling Task Force has found that a 65% newspaper recycling rate is possible in the U.S. by the year 2000. By that time, New York State publishers say they will voluntarily use recycled newsprint for at least 40% of their total newsprint requirements.

The report, the result of several months of study, was done to find "realistically attainable" levels of recycled newsprint manufacturing capacity and to investigate the steps necessary to encourage investment in new or expanded recycled newsprint facilities. The study concludes that using old newspapers as a fiber for newsprint is technically and economically feasible and that a 65% recycling rate by 2000 is achievable particularly if mandatory collection programs are continued.

Meanwhile, recommendations released by a Connecticut task force studying ways to promote greater use of recycled newsprint within realistic market constraints call for overturning a 1989 state law. The American Newspaper Publishers Assn. (ANPA) strongly supported the findings of the task force. A bill has been drafted and is pending in the state legislature in Hartford.

The task force called for newspapers to gradually increase recycled fiber content in newsprint to 50% by 1999, while the present law mandates that newspapers make 20% of their newsprint consumption from recycled-fiber newsprint by 1993 and increase the amount of recycled-fiber consumption to 90% by 1998.

- Spurred by concern over Chicago Ill.'s bulging landfills, Edward Burke, an alderman from the city's 14th Ward, has proposed an ordinance requiring all packaging on products sold in Chicago to be recyclable by 1992. The new law, which would affect paper as well as glass, wood, and metal, would also set goals for using recycled newsprint. The ordinance would require all newsprint consumers to use 30% recycled fiber newsprint by 1993 in 15% of their product. That would increase to 40% in 1995 and to 50% in 1996. ■

Total wastepaper consumption, 1988-92 (000 short tons).

	1988	1989[1]	1990[2]	1991[2]	1992[2]
Total all grades	**19,886**	**20,878**	**22,570**	**23,740**	**24,962**
Total paper	**5,650**	**5,960**	**6,596**	**7,087**	**7,397**
Newsprint	1,431	1,498	1,754	1,831	1,965
Printing, writing, and related	1,416	1,447	1,517	1,608	1,635
Packaging and ind. converting	265	253	253	255	259
Tissue	2,538	2,762	3,072	3,393	3,538
Total paperboard	**13,371**	**14,034**	**15,021**	**15,671**	**16,594**
Kraft, bleached, and unbleached	2,042	2,311	2,694	2,830	3,035
Semichemical	1,845	1,935	2,063	2,093	2,294
Recycled corrugating	2,081	2,165	2,343	2,436	2,483
Other recycled	7,403	7,623	7,921	8,312	8,782
Construction paper & board	**885**	**884**	**953**	**982**	**991**

1. Estimated actual consumption.
2. Estimated consumption of full capacity operations.
Source: API Capacity Survey, 1989.

EXPANSION/MODERNIZATION

James River defers mill, looks at recycled project

James River Corp. has indefinitely deferred plans to build an integrated pulp and coated board mill in Michigan's Upper Peninsula. However, it is considering adding a 100,000-tpy recycled fiber mill on the West Coast. The fiber would be used for the towel and tissue business and for communication paper at existing locations.

Thomas Myers, vice president-corporate development, said the company had been studying construction of an integrated board mill, perhaps with production of chemi-thermomechanical pulp. Pulp production would have been about 1,000 tpd.

The site of about 1,200 to 1,800 acres is very suitable for pulp and paper mills, according to local studies, Myers said. The area has been hard hit by a decline in mining.

Greenpeace USA issued a statement claiming that the opposition by community and environmental groups helped to sink the project, particularly in regards to dioxins produced through bleaching. Myers said the project had not gotten to the environmental study stage. He added that the decision was based on where best to spend the company's financial resources.

"We feel an environmentally suitable mill can be built up there," Myers said. "We are committed to having no detectable dioxin in our products."

In addition to the possible West Coast recycled fiber mill, James River plans to spend money for the previously announced doubling of capacity at the James River-Marathon Ltd. bleached kraft pulp mill in Marathon, Ont. ■

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PULP & PAPER

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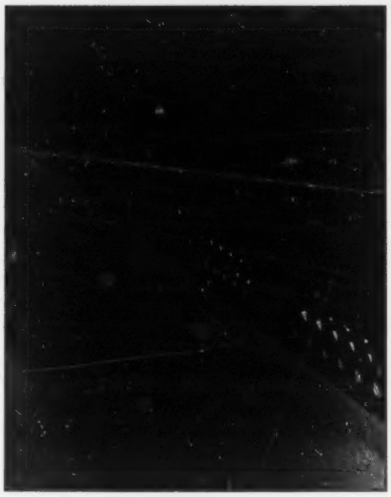

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THE COVER

This issue's dual focus includes five articles on the industry's latest pressing and drying techniques as well as seven features on current coating technology and trends. **(Photo of gas-fired infrared dryer on No. 3 paper machine at Wausau Paper's Brokaw, Wis., mill courtesy of Wausau Paper Mills Co.)**

SPECIAL REPORT

RECYCLING

In-depth, 16-page report examines the impact of waste-reduction legislation on the paper industry in the 1990s and looks at the major changes in markets and technology that will come about as public opinion shifts to a preference for recycled products (supplement begins after p. 100)

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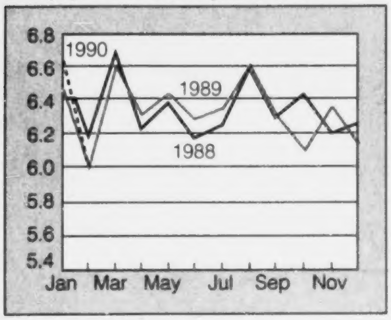
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.1 million tons in February, an increase of 1.4% over last year, according to the American Paper Institute. Most of the gains were in the paper sector, where production rose 2.5% to a seasonally adjusted rate of 39.2 million tpy. The seasonally adjusted rate of paperboard production dipped 0.2% in February to 38.2 million tpy.

Among major grades, shipments of printing and writing paper were up 2.4% in the first two months of 1990 from a year earlier, led by strong growth in groundwood paper. Newsprint has picked up strongly as well, with production up 11.6% through February and shipments up 13.7% compared with last year. Containerboard production for domestic use was off 0.1% from last year, while production for export rose 4.8%. Boxboard output rose 0.5% for domestic use and 16.0% for export.

Canadian newsprint shipments totaled 718,000 metric tons in February, down 1.8% from a year earlier, according to the Canadian Pulp & Paper Assn. Operating rates stood at 94%, down from 99% last year. Woodpulp shipments totaled 611,000 tons for the month, down 7.8%, with operating rates falling from 95% in 1989 to 91% this year. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Feb.	510	14.6	6,378	11.6
Uncoated groundwood (s)	Feb.	145	9.0	1,812	6.8
Coated paper (s)	Feb.	569	3.5	7,262	2.2
Uncoated free-sheet (s)	Feb.	903	0.8	11,386	1.9
Other printing/writing	Feb.	124	4.2	1,566	7.1
Total packaging and other paper (s)	Feb.	373	-8.8	4,726	-6.3
Tissue	Feb.	452	3.4	5,562	2.5
Total paper	**Feb.**	**3,077**	**2.9**	**38,683**	**2.6**
Unbleached kraft paperboard	Feb.	1,538	1.1	19,328	1.4
Semichemical medium	Feb.	430	-2.3	5,618	-2.1
Bleached paperboard	Feb.	356	4.4	4,439	1.5
Recycled paperboard	Feb.	671	-3.3	8,473	-1.9
Total paperboard	**Feb.**	**2,993**	**-0.1**	**37,757**	**0.1**
Total U.S. paper and paperboard output	**Feb.**	**6,070**	**1.4**	**76,441**	**1.4**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Jan.	5,483	0.3	65,800	0.4
Market pulp production	Jan.	771	-0.8	9,247	-0.8
Wastepaper consumption at paper/board mills	Jan.	1,767	12.4	21,208	6.7
Pulpwood consumption (cords)	Jan.	8,553	6.4	102,636	2.3
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Feb.	24.544	1.5	52.076[6]	2.6
Containerboard inventories at U.S. box plants and mills	Feb. 1	2,705	-0.1		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Jan.	1,113	4.7	13,367	4.4
Imports of Canadian newsprint	Jan.	595	-12.9	8,339[6]	4.2
U.S. paper exports (including products)	Jan.	581	32.3	6,974	32.6
Exports of unbleached kraft linerboard	Jan.	220	37.5	2,634	37.4
Exports of woodpulp	Jan.	420	-8.1	5,041	-8.1
Norscan pulp inventories[4]	Feb. 28	1,475	65.7		
Norscan pulp operating rates[4]	Feb.	94%	96%	86%	93%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Feb.	718	-1.8	1,434[6]	-4.0
Operating rates	Feb.	94%	99%	94%	99%
Inventories held by U.S. consumers	Feb. 28	1,297	-10.4		
Other paper/board shipments	Feb.	555	4.9	1,166	8.6
Woodpulp shipments (export only)	Feb.	611	-7.8	1,224	-3.9
Operating rates	Feb.	91%	95%	92%	96%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Coated groundwood: Inventory workdowns cut into deliveries, prices

Grade structure: Coated publication paper is classified as groundwood if it contains 10% or more mechanical pulp, with the balance made up of chemical pulp and fillers. Coated groundwood's share of all coated paper was about 56% in 1989, down 1% from 1988. Increasing demand for higher-value paper reduced No. 5 from 85% of all coated groundwood to 83% in 1989. The rest is the No. 4 grade, which has higher brightness and usually heavier basis weights. No. 5 is valued for its lighter basis weights and runability.

Basis weights for coated groundwood paper usually run from 32 lb to 50 lb (25 × 38 in. in reams of 500 sheets). Some 30-lb and 70-lb paper also is made. Coating weight on lightweight coated (LWC) paper may be about 30% of total sheet weight.

Lower-end coated groundwood paper competes with uncoated groundwood, particularly supercalendered, while higher-end paper may compete with coated free-sheet grades. End uses include advertising inserts and flyers, consumer and trade magazines, Sunday newspaper supplements, catalogs, direct mail, and other commercial printing.

Production/capacity: Coated groundwood production dropped about 3.8% in 1989 from 1988. This is due primarily to the workdown of inventories that customers had built in anticipation of price increases in late 1986 through 1988.

Almost 500,000 tpy of new coated groundwood capacity was brought online in 1989 from two new machines at Blandin Paper Co. (250,000 tpy) in Grand Rapids, Minn., and Repap Enterprises Inc.'s 230,000-tpy machine in New Castle, N.B. (this is a swing machine between coated groundwood and coated free-sheet).

Canadian coated groundwood paper capacity jumped from about 430,000 short tpy in 1989 to 573,000 tpy in 1990. The American Paper Institute said U.S. coated groundwood capacity was almost 4.5 million tpy in 1989, rising to slightly over 4.6 million tpy in 1990.

Because of overcapacity, a number of mills have postponed decisions on further expansion (*P&P*, Jan. 1990, p. 35). Among the machines probably delayed are a second machine at Blandin; Repap at Prince Rupert, B.C., or The Pas, Man.; Fraser Inc. at Edmundston, N.B., or Madawaska, Maine; and Bowater Inc. at Calhoun, Tenn. In addition, the proposed joint venture between Great Northern Nekoosa Corp. and MD Papier GmbH of Fed. Rep. Germany for a coated groundwood mill near Millinocket, Maine, has been at least put on hold pending a review by Georgia-Pacific Corp., which is acquiring GNN.

Boise Cascade Corp. is proceeding with a new 290,000-tpy machine at Rumford, Maine, due for startup in 1993. In addition, Pentair Inc. upgraded its publication paper mill in Niagara, Wis., adding 40% more coated groundwood capacity, bringing the mill rating to 320,000 tpy, and adding a Tampella pressurized groundwood system.

Coated groundwood is also affected by increased capacity in high-end uncoated groundwood grades.

Outlook: Inserts and coupons growth may slow down. Inserts primarily use coated groundwood (about 783,000 tons in 1988) and newsprint (720,000 tons in 1988), according to Andover International Association.

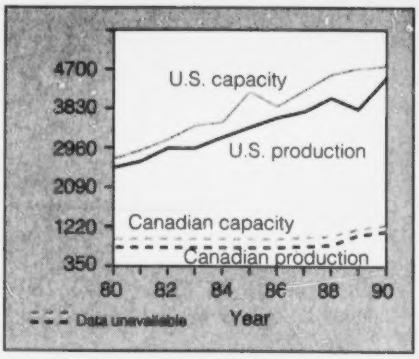
Magazines continue to do relatively well. Catalogs and other commercial printing (direct mail, circulars, annual reports, etc.) may remain solid.

One analyst said coated groundwood shipments could rise 8.3% in 1990 from last year. But operating rates will hover around 90% in 1990, the same as in 1989.

Prices: Discounting, sometimes heavy, was reported during 1989 as printers and publishers worked off inventories. Prices probably will remain at current levels throughout the year, though some producers hope to implement a price increase.

Historical transaction pricing trends ($/short ton, year-end, except 1990, which is first quarter) are: for No. 5, 34-lb roto paper, 1982, $760; 1983, $782; 1984, $890; 1985, $931; 1986, $860; $1987, 890; 1988, $990; 1989, $990; 1989, $960.

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	1988[3]	1989[3]	1990e
Production[1]	4,159	4,001	4,141
Capacity[1]	4,347	4,467	4,607
Utilization rate	96%	90%	90%
Imports[e]	507	497	522
Exports[e]	46	116	121
Apparent U.S. consumption	4,620	4,382	4,542
lb/capita	26.48	27.08	28.32
GNP ratio	1.62	1.63	1.68
Canada			
Production[2]	365	377	501
Capacity[2]	380	430	573
Utilization rate	96%	88%	87%
Exports[2,4]	207	422	561
Canadian consumption[2]	202	190	207

e = *Pulp & Paper* estimate. 1. American Paper Institute; 1990 *P&P* estimate. 2. Canadian Pulp & Paper Assn. for 1988 and 1989. 3. Revised. 4. More than 95% shipped to U.S.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 short tpy)	Market share (%)
1. Champion Papers[1]	689	13.3
2. International Paper Co.[2]	645	12.5
3. Consolidated Papers Inc.[2]	580	11.2
4. Repap Enterprises Corp.	520	10.0
5. Boise Cascade Corp.	390	7.5
6. Mead Corp.	335	6.5
7. Blandin Paper Co.	311	6.0
8. James River Corp.	315	6.1
9. Pentair Inc.[3]	220	4.2
10. Noranda Forest Inc.	194	3.7

Market share of top five companies:
54.5%
Market share of top ten companies:
81.1%
Total North American capacity/yr (1990):
5,180
U.S.: 4.607 million short tons
Canada: 573,000 short tons

1. 1990 production. 2. *P&P* estimate. 3. Niagara of Wisconsin studying upgrade to 300,000 tpy.
Sources: Company data; *Pulp & Paper Forecaster*, Dept. of Commerce; API; CPPA.

Recycling Capacity to Increase at Record Rates as Laws Proliferate

The paper industry will have to adjust over the next several years to major changes in markets and technology as public opinion shifts to a preference for recycled products

By DEBRA A. GARCIA, Senior News Editor

As recently as five years ago, wastepaper was considered to be primarily a lower-cost alternative to woodpulp. While it still retains this distinction, some other benefits have been added in recent years. Especially in the U.S., laws are being adopted to encourage consumers to buy more recycled paper and paperboard products. The paper industry has been responding to these market pressures with planned expansions in recycled fiber. In the 1990s, recycling is likely to be one of the most predominant concerns for this industry.

The North American paper industry is planning more than 60 projects involving secondary fiber processing plants, 50% more than a year earlier, according to an October 1989 *Project Report* (Table 1). Projects at paperboard mills remain the most common, but expansions in recycled tissue and newsprint have grown the fastest. Eighteen secondary fiber projects were listed in 1989 for newsprint mills, up from just six a year earlier; 15 projects were planned at tissue mills in 1989 compared with six in 1988.

WASTEPAPER GROWTH. In a special wastepaper survey conducted last November by the American Paper Institute (API), U.S. papermakers told the U.S. trade association that their future plans would account for a consumption level by 1995 of 31.4 million short tons of wastepaper—mostly old corrugated containers (OCC) and old newspapers (ONP). This means a 50% increase in usage over the 20 million short tons reached in 1988.

API reported in its 1989 Capacity Survey that recycled fiber capacity would grow at twice the rate of woodpulp capacity over the next three years. Consumption of wastepaper in the manufacture of paper and paperboard will rise from an estimated 20.9 million short tons in 1989 to nearly 25 million short tons in 1992 (Tables 2 and 3). This rate of growth will average 6.2% annually through 1992, raising the percentage of wastepaper used by the industry to 27.2% by 1992 from 25.4% in 1989. Woodpulp consumption will drop to 72.8% of fiber supply from 74.6%.

During the first eight years of the 1980s, the paper and board industry's use of wastepaper worldwide grew by 50%, while its dependence on this recycled material source increased steadily, according to Jaakko Pöyry Oy. In its recently released study, "Recycled Fibre, An Underutilized Opportunity," the firm projects that worldwide use of recycled fiber will continue to grow. It expects global consumption of wastepaper to have passed the 100-mil-

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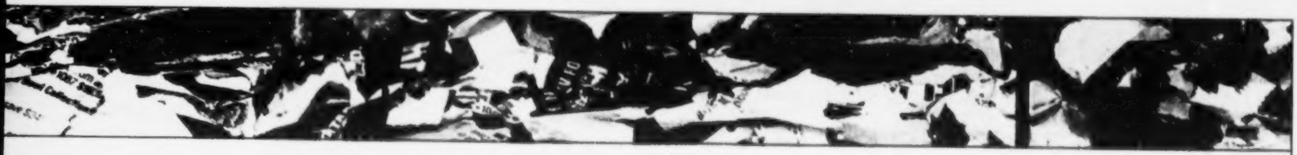
This report was prepared with the assistance of Jaakko Pöyry Oy, which has recently completed a major multiclient study, "Recycled Fiber, An Underutilized Opportunity."

Cover photo courtesy of Perry H. Koplik & Sons Inc.

Wastepaper processing projects at U.S. and Canadian mills.

Start date	Cost ($ million)	Company, mill site	Additional Information (capacity figures in metric tons)
U.S.			
1989	3.8	Atlas Tissue, Hialeah, Fla.	Tissue expansion with new deinking line sized to accommodate a future third paper machine
1990		Augusta Newsprint, Augusta, Ga.	Install new 90,000-tpy deinking plant
none	—	Bear Island, Ashland, Va.	Install deinking facilities once a pattern of recycling laws and market needs is established
1991	—	Bowater, Calhoun, Tenn.	Build new deinking facility at Bowater Southern newsprint mill
1991	11.0	Champion, Roanoke Rapids, N.C.	Install processing plant for old corrugated containers
1990	148.9	Chesapeake, Menasha, Wis.	New deinking line; part of 80,000-tpy tissue expansion which includes new paper machine
1990	20.0	Chesapeake, West Point, Va.	Replace high-density dispersion and screening equipment in secondary fiber plant to reduce contaminants and improve quality; adds 125,000 tpy to capacity
1989	—	Converters, Rockford, Mich.	Install Black Clawson Lo-density pulping system to upgrade wastepaper cleaning system
1989	4.3	Corrugated Services, Forney, Texas	Expand recycled medium capacity 50%; includes two 34-in. refiners, cleaning equipment
1992	200.0	Daishowa, Stockton, Calif.	Build new 350,000-tpy recycled containerboard mill with state-of-the-art secondary fiber technology; joint venture partner is Trans-Rim Ltd.
none	—	Daishowa, Port Angeles, Wash.	Considering production of directory paper as light as 20 lb with 30% recycled fiber
1988-90	—	Federal Paper Bd., Sprague, Conn.	Stock cleaning upgrade with seven Black Clawson Ultra screens to process ONP, OCC
1991	125.0	Fort Howard, Rincon, Ga.	Fourth recycled tissue machine installation includes fiber processing expansion
1989	62.0	FSC, Alsip, Ill.	New 80,000-tpy recycled tissue mill, with stock preparation system from Bird Escher Wyss
none	20.0	FSC, Alsip, Ill.	Supplement washing system at recycled newsprint mill with flotation to handle new wastepaper grades to be collected for adjacent new tissue mill
1989	0.6	Garden State, Garfield, N.J.	Replace washed news chest agitator; add pulper scavenger system
none	—	Garden State, Northeast U.S.	Studying construction of a greenfield recycled newsprint mill for U.S. northeast
1989	—	Gaylord Container, Antioch, Calif.	Black Clawson stock cleaning and screening system for mill upgrade
1989-91	35.0	Golden State, Pomona, Calif.	Two-year mill upgrade includes washing and screening improvements in deinking plant
none		Golden State, Pomona, Calif.	Studying addition of a new recycled newsprint machine, which would require additional deinking capacity; expanded mill would use up to 400,000 tpy of ONP
none		Great Northern, East Millinocket, Maine	Add 250,000-tpy deinking plant for recycled newsprint production
1989	25.0	Great Southern, Cedar Springs, Ga.	Modifications to boost recycled fiber usage in linerboard by 15,000 tpy
1989	—	Green Bay Pack., Green Bay, Wis.	Expand, modernize secondary fiber system for 350-tpd semichemical medium expansion
1990	—	Green Bay Pack., Morrilton, Ark.	Upgrade secondary fiber system for 350-tpd kraft linerboard expansion program
1989	—	Hyde Park Paper, Hyde Park, Mass.	Restarted idle mill to produce recycled fine papers on one machine
1990	35.0	Inland Container, Newport, Ind.	Recycled medium expansion; includes new pulper, refiners and cleaners for wastepaper
none	—	Intl. Paper , Riegelville, Pa.	Restart 375-tpd recycled containerboard mill; includes modernization of fiber system
1989	26	James River, Green Bay, Wis.	Build a secondary fiber plant to replace some sulfite capacity, adhere to discharge limits
none	—	James River, Halsey, Ore.	Studying a secondary fiber plant to supply tissue and communication paper mills in Halsey, Clatskanie, Ore., and Camas, Wash.
1991	—	Kenaf North Am., Muskogee, Okla.	Build new 750-tpd recycled linerboard mill
1989	150	Kimberly-Clark, Jenks, Okla.	Construct 68,000-tpy tissue mill; furnish will be combination of pulp and recycled fiber
1990	—	Kimberly-Clark, Loudon, Tenn.	Construct new tissue mill, about half the size of Jenks mill; furnish is pulp, recycled fiber
1989	12.5	Longview Fibre, Longview, Wash.	Construct new 300-tpd secondary fiber plant with pulping, screening and cleaning system for OCC from Black Clawson
1991	66.0	MacMillan Bloedel, Pine Hill, Ala.	Containerboard mill modernization includes changes to increase use of recycled fiber
1989	20	Macon Kraft, Macon, Ga.	Expand and modernize wastepaper pulping; part of quality program and liner expansion



Start date	Cost ($ million)	Company, mill site	**Additional Information** (capacity figures in metric tons)
U.S.			
1991	35.0	Menasha, Otsego, Mich.	Corrugating medium expansion; includes new wastepaper processing system to expand secondary fiber usage form 40% of total furnish to 50%
1990	66.0	Mi Ho Paper, St. Joseph, Mo.	Construct new fine paper mill furnish will be market pulp and recycled fiber
none	—	Mosinee, Cheboygan, Mich.	Install deinking facility at newly purchased mill for tissue expansion
none	480.0	Northampton Pbd, Northampton, Pa.	Proposed 300,000-tpy recycled linerboard mill
1991	300.0	North Pacific, Longview, Wash.	Newsprint expansion; new 180,000-tpy deinking plant will allow production of recycled news, supply 80% of additional fiber for new machine, and 25% of overall mill needs
1989	—	Putney Paper, Putney, Vt.	Install two new Voith Morden pulpers and Sulzer Escher Wyss deinking cells and screening equipment for tissue expansion
1990	14.0	Recycled Paper Board, Clifton, N.J.	Reopen mill to produce 200 to 300 tpd recycled board from up to 400 tpd of wastepaper
none	—	Smurfit, Fernandina Beach, Fla.	Expand secondary fiber facilities for 600-tpd recycled containerboard machine restart
1990	—	Smurfit Newsprint, Newberg, Ore.	Install flotation deinking system to enable use of magazine stock in recycled news furnish
none	—	Smurfit Newsprint, Northeast U.S.	Studying feasibility of building a new 255,000-metric-tpy recycled newsprint mill, to consume 300,000 tpy of wastepaper
1989	—	Smurfit Newsprint, Oregon City, Ore.	Flotation deinking system to enable mill to use magazine stock in recycled new furnish
1989	300.0	Southeast Paper, Dublin, Ga.	Newsprint expansion; includes Black Clawson 1,500-tpd Hydrapulper deinking system with 900 tpd cleaning and screening
1989	18	Stone Container, Uncasville, Conn.	Paper machine rebuild and recycled fiber system upgrade; adds 60,000 tpy medium
none	100	Trans Rim, Dunkirk, N.Y.	Proposed 200,000-tpy recycled containerboard mill, to process 220,000 tpy OCC
1989+	—	Virginia Fibre, Riverville, Va.	Install new 500-tpd Beloit Jones recycled fiber system at medium mill
1989	—	Visy Recycle, Hartford City, Id.	Restart shutdown 3M mill to produce 150 tpd of recycled medium
1991	30.0	Weston, Terre Haute, Ind.	Corrugating medium expansion; includes OCC recycling expansion with new refiners and repulper to improve stock cleaning and processing
Canada (C$ million)			
1989	—	Atlantic Packaging, Whitby, Ont.	New 185,000-tpy recycled newsprint and tissue mill; furnish will be 65,000 tpy of computer printout and ledger for tissue and 165,000 tpy of old newspapers for newsprint
1991	80.0	Balaclava Enterprises, Vancouver, B.C.	New 122,500-tpy market deinked pulp mill
1991	75.0	Canadian Pacific, Thunder Bay, Ont.	Install deinking plant to supply 237,500-tpy recycled newsprint output
1990	20.0	Cascades, East Angus, Que.	Install new 60-tpd deinking plant at boxboard mill to allow use of higher wastepaper grades
1989	30.0	Cascades, Kingsey Falls, Que.	Tissue expansion; includes new deinking line
none	100.0	Cascades/Steinbeis, East Angus, Que, or Niagara Falls, N.Y.	Joint venture to produce 100,000 tpy of recycled computer printout paper from 120,000 tpy of ONP; either location would require a new deinking plant
none	—	Daishowa, Quebec City, Que.	Considering use of recycled fiber in newsprint furnish
none	65.0	Donohue, unspecified location	Build 80,000-tpy deinking plant at Clermont, Que., or Montreal, Que.
none	75.0	Fletcher, undecided location, B.C.	Considering secondary fiber plant for Elk Falls or Crofton; both washing and flotation systems are under study
none	100.0	Fraser, Thorold, Ont.	Studying new 272-tpd deinking plant to boost secondary fiber use from current 23,000 tpy
none	53.0	Kruger, Bromptonville, Que.	Add deinking plant for recycled newsprint production
none	75.0	Mac. Bl., undecided location, B.C.	Build new 200- to 300-tpd deinking plant at Port Alberni or Powell River for recycled news
1991	45.0	Perkins Papers, Candiac, Que.	Tissue expansion with new paper machine, new deinking line
1991+	24.0	Quebec & Ontario, Thorold, Ont.	Convert washing deink plant to flotation and install post refining in flotation
1990	31.0	Scott, Crabtree, Que.	Build new 65-tpd secondary fiber line; boosts recycled fiber capacity to 165 tpd
none	—	Soucy, Riviere-du-Loup, Que.	Install deinking facilities once a pattern of recycling laws and market needs are established
1991	—	Stone-Consolidated, unspecified location	Add deinking at one of its Canadian mills

TABLE 2: **U.S. wastepaper demand, 1988 and 1995 (million short tons).**

	1988		1995	
Wastepaper grade	**Actual demand**	**Recovery rate (%)**	**Projected demand**	**Recovery rate (%)**
Old newspapers	4.8	34.8%	8.0	51.6%
Corrugated	12.4	51.6	18.8	66.0
Mixed	2.9	13.0	4.1	15.0
Pulp substitutes	3.6	100.0	4.0	100.0
High-grade deinking	2.5	37.0	4.4	50.0
Total	**26.2**	**30.6%**	**39.3**	**38.5%**

Source: Franklin Associates Ltd.

lion-metric-ton mark by 1996 and to reach 130 million metric tons by the end of 2001, the period its forecast covers.

Worldwide, close to 75 million metric tons of recycled fiber were used in paper and paperboard manufacture in 1988, accounting for almost one-third of the total papermaking fiber needs of the industry (Figure 1). In 1989, 27.6 million short tons of wastepaper were collected for recycling in the U.S. Of this, 21.3 million short tons were used by the U.S. paper industry and 6.3 million short tons were exported.

GRADES VARIED AND COMPLEX. Wastepaper is also referred to as paperstock, secondary fiber, and recyclable paper. Mixed paper, ONP, OCC, pulp substitutes, and deinking are the five official wastepaper grade categories used by the Dept. of Commerce and are generally accepted by the industry as the key benchmarks for numerous other grades. The Paper Stock Institute of America subdivides these five groups into more than 80 definitive grades with precise specifications that are periodically reviewed and updated.

The grade characteristics are as follows:

- Mixed paper: includes paper of varied quality, often office waste, as well as boxboard cuttings and mill wrappers.
- ONP: includes old newspapers, either collected from households or overissues at newsstands or inplant; also groundwood paper trim.
- OCC: includes used corrugated containers as well as container plant cuttings.
- Pulp substitutes: includes unprinted grades of brown and colored kraft, tabulating cards, white and semibleached sheets and cuttings, and shavings or trim of unprinted grades.
- Deinking: includes the deinking grades of white and colored ledger, computer printout (CPO) paper, coated book and groundwood paper, and bleached sulfate sheets and cuttings.

The demand for recycled fiber worldwide has grown fast—twice as fast as the demand for virgin fiber pulp (5.0% annually vs 2.5% annually during 1970-88), according to Jaakko Pöyry. In the U.S., results of API's 1989 Capacity Survey indicate that the U.S. industry's use of wastepaper will grow twice as fast as its consumption of woodpulp over the next three years, according to Richard E. Storat, API's vice president-economic and financial services.

Projected 1991 U.S. paper industry consumption of wastepaper will reach 23.7 million short tons, according to the latest API survey. Just a year earlier, the same survey results had reflected that consumption would be 23.0 million short tons—a

As more municipalities adopt waste-reduction laws, more households will be separating their recyclables before disposal. (Photo courtesy of Browning-Ferris Industries.)

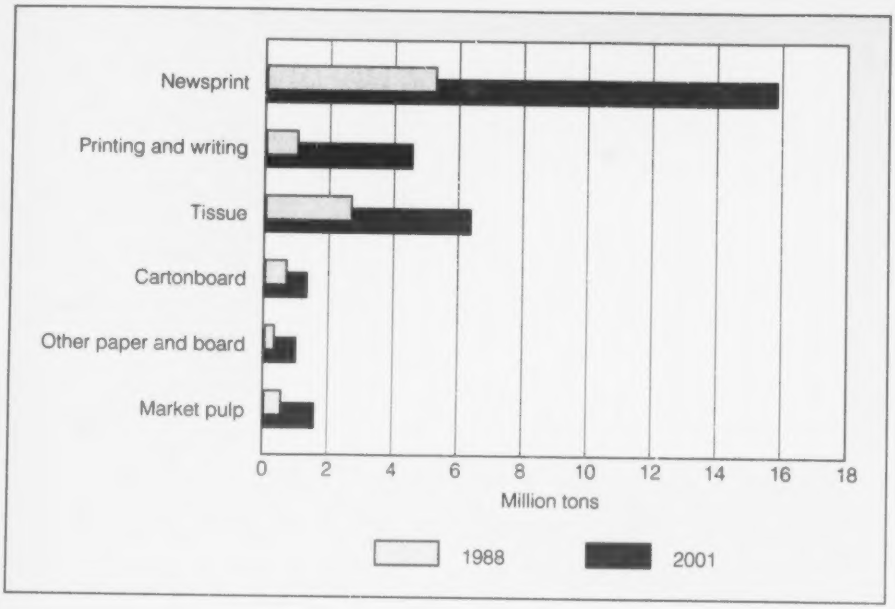


FIGURE 1: **World usage of deinked pulp, 1988 and 2001.**

boost of 714,000 short tons in projected expansions in surveys just one year apart. During the same period, planned 1991 woodpulp consumption is expected to drop by 2.3% to 65.1 million short tons.

LAWS SPUR DEMAND. Improvements in technology, scarcity of virgin fiber, and the incentive of a lower-cost fiber alternative have contributed to the growth in secondary fiber consumption. In recent years, however, environmental issues have been a significant catalyst. In the U.S., the landfill problem has caused lawmakers to look for alternatives, and recycling has proven to be the safest choice politically. The public is generally opposed to alternatives such as siting new landfills and incineration.

Laws preceding these, in the early 1980s, began to attack the solid waste problem by mandating municipal source-separation of recycled materials. A few years later, some of these public programs began to fail when more paper was generated than the market would accept. Now, legislators have come back to the table with bills to enhance markets that could consume the increasing generation of wastepaper. Legislation on waste reduction has been enacted in about 20 U.S. states, in many municipalities, and is in the pipeline in many more.

Typically, the laws cover source separation, procurement preference, and recycled content in newsprint. These laws include the following: 1) laws requiring consumers of newsprint to use recycled-fiber newsprint for a certain portion of their total requirements (Table 4), 2) federal, state, and municipal procurement policies favoring recycled materials, and 3) mandated source-separation of newspapers by households. This

TABLE 3: **Total U.S. wastepaper consumption, 1988-92 (000 short tons).**

	1988	**1989[1]**	**1990[2]**	**1991[2]**	**1992[2]**
Total all grades	**19,886**	**20,878**	**22,570**	**23,740**	**24,982**
Total paper	**5,650**	**5,960**	**6,596**	**7,087**	**7,397**
Newsprint	1,431	1,498	1,754	1,831	1,965
Printing, writing, and related	1,416	1,447	1,517	1,608	1,635
Packaging and industrial converting	265	253	253	255	259
Tissue	2,538	2,762	3,072	3,393	3,538
Total paperboard	**13,371**	**14,034**	**15,021**	**15,671**	**16,594**
Kraft, bleached, and unbleached	2,042	2,311	2,694	2,830	3,035
Semichemical	1,845	1,935	2,063	2,093	2,294
Recycled corrugating	2,081	2,165	2,343	2,436	2,483
Other recycled	7,403	7,623	7,921	8,312	8,782
Construction paper and board	**885**	**884**	**953**	**982**	**991**

1. Estimated actual consumption.
2. Estimated consumption of full capacity operations.
Source: API Capacity Survey, 1989.

follows a goal set by the Environmental Protection Agency (EPA) for a 25% reduction in solid waste by 1992.

On June 22, 1988, EPA issued the "Guideline for Federal Procurement of Paper and Paper Products Containing Recovered Materials," as required under section 6002 of the Resource Conservation and Recovery Act (RCRA) in an effort to stimulate demand for products made from materials recovered from solid waste. One year later, all of the federal government agencies responsible for procuring paper were required to give preference to recycled products, and state and local governments that purchase $10,000 worth or more using appropriated federal funds must also follow the EPA guidelines (Table 5).

CANADIAN INVESTMENT RISKY. In Canada, though, there is growing concern that recycled projects may be built more quickly than the supply of wastepaper can be generated. Canada recycles only about 10% of its wastepaper, compared with a U.S. recycling rate of about 24%.

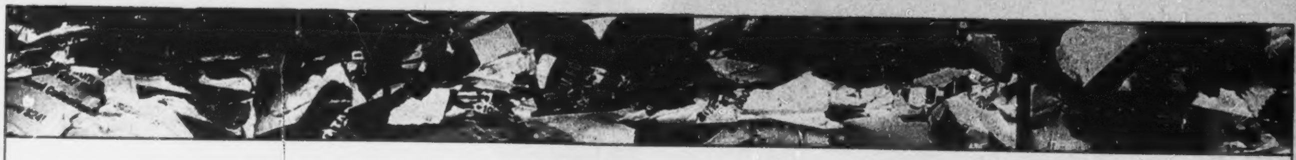
> *At the Candian Pulp & Paper Assn.'s (CPPA) annual meeting in January, Howard Hart, CPPA president, projected a shortage of ONP in Canada by the end of this year.*

At the Canadian Pulp & Paper Assn.'s (CPPA) annual meeting in January, Howard Hart, CPPA president, projected a shortage of ONP in Canada by the end of this year. Hart noted that even if six out of ten old newspapers in Ontario—an estimated 340,000 metric tons—were to be collected for recycling, a shortage would still exist. Canadian mills would be forced to import the rest—undoubtedly from the U.S. CPPA has moved recycling from its environmental agenda to its economic agenda, noted John Houghton, president of Quebec & Ontario Paper Co. Ltd., which is the only current producer of recycled-content newsprint in Canada.

Reportedly, the Ontario Forest Industries Assn. said the amount of newspapers collected for recycling in Ontario reached 234,000 metric tons in 1988, when Toronto began to recycle. About 190,000 metric tons of ONP are used by Q&O.

Companies in Canada are also more skeptical than those in the U.S. about the long-term benefits of investing in recycled fiber equipment. Besides concerns about possible secondary fiber shortages, they are also uncertain about whether it would be feasible for many Canadian mills to use wastepaper, as these mills tend to be remote from metropolitan areas. Canadian producers have begun asking local and federal agencies for assurances of their commit-

The 1990s will see a trend toward harvesting the urban forests of wastepaper, which are most productive in large metropolitan regions. (Photo courtesy of Jefferson Smurfit Corp.)



ment to recycling and for financial assistance.

Cascades Inc. and Kruger Inc. earlier this year separately postponed plans involving recycling projects, pressuring the government to provide some support. In the meantime, across the border in New York, state officials are offering economic incentives if Cascades decides to go ahead with its plans at Niagara Falls, N.Y.

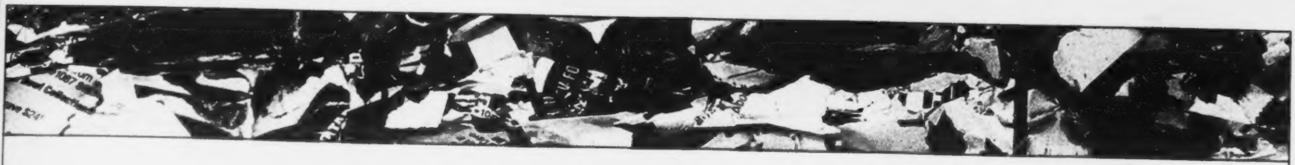
Still, other Canadian companies are forging ahead with recycled-fiber projects. Canadian Pacific Forest Products Ltd. plans to add deinking at its mills in Gatineau, Que., and Thunder Bay., Ont., and Abitibi-Price Inc. has publicly stated it will build deinking facilities in Canada but has not selected any sites yet.

Kruger wants to build a C$53-million deinking plant adjacent to its newsprint mill in Bromptonville, Que., while Cascades has been looking at several locations for a joint venture with Steinbeis & Consortium GmbH (*P&P*, Nov. 1989, p. 39). Using the Fed. Rep. Germany company's technology, a 100,000-metric-tpy recycled CPO and copier paper mill would use 100% ONP. Depending on where the mill is constructed, it could cost from C$40 to C$150 million.

Quebec reportedly is looking at a new program to encourage mills to use ONP and old magazines. This could include financial aid for new deinking plants. To qualify, deinking plants would have to draw at least 50% of their raw materials from

U.S. recycled newsprint legislation.

State laws	Fees or credits[1]	Consumption[2] Goal	Consumption[2] Timetable	Status
California	Penalties not to exceed $1,000/violation	25% 50%	1/1/91 1/1/2000	Passed
Connecticut		20% 90%	12,31,93 12/31/98	Passed
Florida	10¢/ton tax until 10/92; 50¢/ton if goal not reached	50%	1992	Passed
Illinois				
H.B. 2912:	10¢/ton disposal fee not to exceed $5,000		1991-93	Pending
H.B. 2458:			1/1/91	Pending
Kentucky		50% 75%	7/16/91 7/15/92	Pending
Louisiana	10¢/ton tax			Failed
Maine	Up to $1,000/violation	20% 90%	12/31/93 12/31/97	Pending
Maryland	$15/ton for every short of goal	12% 40%	1992[3] 1998	Pending
Massachusetts		20% 80%	12/31/93 12/31/97	Pending
Missouri				
H.B. 949:	10% of the cost/ton on virgin newsprint consumed	10% 50%	1992 1996	Pending
S.B. 513:		10% 50%	1993[4] 1997	Pending
Nebraska	$1/ton tax			Failed
New Jersey				
A. 627		45%	1990[4]	Pending
A.B. 4703		45% 90%	12/31/89 1991	Pending
New York				
S.B. 4504:	Paper not meeting requirement not to be sold in state		1991[4]	Pending
S. 6779:	$500 to $1,000/violation	11% 40%	1/1/92 1/1/2000	Pending
N. Carolina	10¢/ton tax			Failed
Oregon	$1/ton tax			Failed
Pennsylvania	2% reduction in state income tax if goal is reached	50%		Pending[4]
Rhode Island				
H.B. 7923:	Restraining order issued	20% 90%	1993 1998	Pending
S.B. 2053:	$20,000/day			
H.B. 8411:		10% 50%	1/1/91 1/1/96	Pending



Quebec. The province's Forestry Act may also be amended to require greater use of not only wastepaper but also woodchips in order to conserve forests.

In Alberta, the provincial Liberal environmental critic Grant Mitchell criticized the provincial government for attracting kraft pulp mills to the province while the North American trend is toward recycling.

In Canada, as in other areas of the world, future growth in recovery rates for wastepaper may not be as promising as it is in the U.S. (Recovery rate is the ratio of recovered fiber collected to paper and board consumed.) Much of what will be needed to meet future growth in world demand for secondary fiber will come from the U.S.

Jaakko Pöyry projects the worldwide recycled fiber utilization rate will increase to 41.0% in 2001 from 32.8% in 1988, assuming global consumption and production of paper and paperboard will grow an average of 2.6% (to 317 million metric tons from 226 million metric tons in 1988). The U.S. utilization rate will grow to 31.3% from 22.8% currently during this period (Table 6). (Utilization rate is the ratio of recycled fiber consumed to paper and board produced.)

WORLD GROWTH TIED TO U.S.

While both Western Europe and Japan will be self-sufficient to a high degree (importing some better qualities mainly to reinforce the strength of the secondary fiber stream), the

State laws	Fees or credits[1]	Consumption[2] Goal	Timetable	Status
S. Dakota	10%/ton cost of virgin newsprint used short of goal	10%	1992	Pending
		50%	1996	
Vermont S.B. 326:		25%	7/1/91	Pending
		90%	7/1/95	
H. 766:	10% of annual newsprint cost or formula based on "consumers recycling index"	25%	7/1/93	Pending
Virginia	10¢/ton tax	10%	1/1/98	Pending
Washington				Failed
S.B. 6338:	Up to $1,000/violation	25%	1/1/92	Pending
		50%	1/1/2000	
H. 2562		10%	1/1/92	Pending
		30%	1/1/2000	
Wisconsin S.B. 300:	10% of total annual newsprint cost multiplied by recycling status	10%	1991	Pending
		50%	1995	
Amendments:	Voluntary compliance	5%	1991[5]	Pending
		20%	2001	
W. Virginia		25%	1/1/93	Pending
		80%	1/1/96	
Federal laws: S.B. 1763:	Credits for excess recycled newsprint made are transferable	10%	1990	Pending
		30%	2000	
S.B. 1764:	Credits for excess recycled newsprint made are transferable	10%	1990	Pending
		40%	2000	
H.B. ????:	(Esteban Torres, D-Calif.)	2% increase each year		

Note: Does not include preference purchasing provisions for government agencies. Includes states where legislation is most advanced.

1. Fees are generally taxes or penalties on virgin-fiber newsprint consumed. Credits generally apply to recycled-fiber newsprint used, and are usually used to offset taxes/penalties.
2. Applies to amount of total consumption that must be recycled-fiber based, unless otherwise noted. Ranges imply goals to be phased-in between these dates.
3. Goals are aggregate of recycled fiber consumed in proportion to total newsprint consumed by individual publisher.
4. State task force has proposed voluntary guidelines. (New York's proposal is to increase recycled fiber consumption gradually from 7% in 1990 to 40% by 2000. Pennsylvania publishers have agreed to use at least 50% recycled newsprint by 1995.
5. Goals are an aggregate of statewide recycled fiber consumed in proportion to total newsprint consumed. Compromise reached late in 1989 proposes to make all consumption goals voluntary and only applicable when recycled-fiber newsprint is available in the quantity, at the quality, and of competitive price to virgin-fiber newsprint.

Sources: American Newspaper Publishers Assn., American Paper Institute.

TABLE 5: **EPA minimum-content standards on major grades.**

Grade	Recovered materials (%)	Postconsumer recovered materials (%)	Wastepaper (%)
Newsprint	—	40	—
Printing/writing			
Offset printing	—	—	50
Mimeo and duplicator	—	—	50
Stationery	—	—	50
Office paper	—	—	50
Copier paper	—	—	—[1]
Envelopes	—	—	50
Form bond	—	—	—[1]
Book paper	—	—	50
Bond paper	—	—	50
Ledger	—	—	50
Cover stock	—	—	50
Cotton-fiber paper	25	—	—
Tissue			
Toilet tissue	—	20	—
Toweling	—	40	—
Napkin	—	30	—
Facial tissue	—	5	—
Doilies	—	40	—
Industrial wipes	—	0	—
Unbleached packaging			
Corrugated boxes	—	35	—
Fiber boxes	—	35	—
Kraft bags	—	5	—
Recycled paperboard			
Folding cartons and other	—	80	—
Pad backing	—	90	—

1. EPA found insufficient production of these papers with recycled content to assure adequate competition.

Source: E.H. Pechan & Associates Inc.

Far East, Canada, and Mexico will be major importers of wastepaper—and only the U.S. will have the potential to meet their needs as well as its own growing requirements.

The U.S. is by far the largest exporter of wastepaper, with shipments reaching a record 6.3 million short tons in 1989. Canada, meanwhile, gets most of its paperstock from the U.S., importing approximately 257,000 short tons last year.

API is projecting continued robust growth in U.S. exports of wastepaper for three main reasons. First, the recovery rates in many prime overseas markets are already reaching their limits, such as in Japan, where the collection rate has actually slipped; second, recycled fiber capacity is expanding worldwide; and, finally, U.S. long-fiber wastepaper is actively sought.

Demand for U.S. wastepaper exports could reach 11.0 to 14.2 million short tons by 1995, according to API estimates. This is based on moderate growth in paper and paperboard consumption outside the U.S. through the mid-1990s and the expectation that the weighted average wastepaper recovery rate for all countries except the U.S. edges up only slightly (Table 7).

Jaakko Pöyry expects that activity in U.S. wastepaper exports will include the following: 1) cross-Pacific trade from the U.S., 2) export of ONP (and also, possibly, magazines) from the U.S. to Canada, 3) export of high-quality OCC and deinking grades from the U.S. to Western Europe, and 4) trade within Western Europe and, later, from Western Europe to Eastern Europe.

EPA has established a procurement guidelines hotline to answer questions from government agencies, paper mills, merchants, and the public. Copies of the guidelines as well as lists of manufacturers and vendors of recycled paper products that meet EPA recommended standards can be obtained. The number is 703-941-4452.

"To meet total demand, both domestic and export new collection records will be set and the collection system will continue to expand," noted J. Rodney Edwards, vice president of API's paperboard group. API estimates world demand for U.S. wastepaper alone will reach about 40 million short tons by 1995, including the estimated 31.4 million short tons of U.S. consumption and 11 million short tons or more that will be exported from the U.S.

Postconsumer grades will constitute nearly 90% of the incremental tonnage required between 1988 and 1995, according to Franklin Associates Ltd. In a study done for API, the firm estimated that by 1995, the collection limits for ONP and OCC will be close to their maximum limits.

U.S. RECYCLING GOAL: 40%. API announced earlier this year that the U.S. paper industry had set a goal to collect and reuse 40% of total domestic production of paper and paperboard by 1995. Currently, the collection rate is 30%. API projects that the U.S. recovery rate in 1995 will be between 38.5% and 41.7% of new supply, which will generate material approximately in balance with projected demand.

A report recently released by the New York State Newspaper Recycling Task Force found that a 65% newspaper recycling rate is possible in the U.S. by the year 2000. By that time, New York State publishers say that they will voluntarily use recycled fiber for at least 40% of their total newsprint requirements. This would have a significant effect on Canadian producers, who now supply much of that consumption.

The report, which resulted from several months of study by the state government, newsprint industry representatives, the New York Newspaper Publishers Assn., and Andover International Associates (AIA), was done to find "realistically attainable" levels of recycled newsprint manufacturing capacity and to investigate steps to encourage investment in new or expanded recycled newsprint facilities.

TABLE 6: **Wastepaper utilization in North America, 1988-2001.**

Grade	**Paper and board production 1988**	**2001**	**Recycled fiber consumption 1988**	**2001**	**Utilization rate (%) 1988**	**2001**
	(million metric tons)					
Newsprint	15.4	19.2	1.5	7.3	9.5	38.0 %
Printing and writing paper	22.7	35.8	1.3	3.4	5.8	9.5
Tissue	5.5	7.0	2.3	3.8	41.6	55.0
Liner and fluting	25.3	33.9	6.2	12.7	24.5	37.5
Cartonboards	7.8	9.3	3.0	3.3	38.4	35.0
Other paper and board	10.0	10.1	5.5	5.5	55.0	55.0
Total	**86.7**	**115.2**	**19.8**	**36.0**	**22.8**	**31.3**

Note: A further 16 million tons of wastepaper will be used in North America by 2001. Liners and fluting medium will use an additional 6.5 million tons and the utilization rate in the corrugating material industry will rise significantly, from 24.5% at present to 37.5%. The use of wastepaper and board will increase in the production of testliner, kraft linerboard and fluting medium. Source: Jaakko Pöyry Oy.

By 1992, under expansion plans announced through late last year, North American recycled newsprint capacity will increase by approximately 375,000 short tons, which is just 18% of the total newsprint capacity expansions planned at that time. However, several more projects have been announced since the study was released, including those mentioned earlier (Table 8).

The growth in deinking capacity in the coming decade is expected to increase to 40% by 2000 from roughly 7% in 1988 (Table 9). According to figures from New York State's Dept. of Economic Development and AIA, a 65% ONP recycling rate in 2000 would mean that 10.2 million short tons of ONP will be diverted from the solid waste stream. This assumes a U.S. newsprint consumption figure of 15.8 million short tons.

No growth is expected to occur in newsprint consumption between 1988 and 1990. This, combined with the expansion of primarily virgin-fiber newsprint manufacturing capacity through 1992, could have a dampening effect on recycled newsprint expansions through 1995. Depending on the extent to which currently weak newsprint market con-

TABLE 7: **U.S. wastepaper exports (million short tons).**

	World paper/board consumption (except U.S.)	**World recovery rate (%) (except U.S.)**	**World wastepaper recovery (except U.S.)**	**World wastepaper utilization rate (%) (except U.S.)**	**Potential U.S. exports**
Actual					
1986	145.1	33.7%	48.9	53.0	4.1
1988	162.8	35.3	57.5	63.5	6.0
Projected					
1995					
(low)	193.5	36.0	69.7	80.7	11.0
(high)	207.1	36.0	74.6	88.8	14.2
Average growth					
1986-88	5.9		8.4	9.5	21.0
1988-95					
(low)	2.5		2.8	3.5	9.0
(high)	3.5		3.8	4.9	13.1

Source: *Pulp & Paper International*, with projections from American Paper Institute.

ditions will affect growth in ONP use, demand could rise by 39% to 66% during 1988-95 and by 71% to 116% during 1988-2000, according to New York State's report.

PRICE INSTABILITY. Wastepaper prices are determined by a combination of demand and the ease with which supplies can be obtained. The actual relationship is hard to quantify, and it varies with the grade of wastepaper. There are also some important differences between countries. But in principal, the buyers, through their actions, set the price level. Mills are prepared to pay more to generate additional supplies but expect to pay less as their requirements are slowing down.

The main characteristic of wastepaper prices in all countries is their instability. Prices are highly cyclical, and their cycles follow the general paper and board industry; but the important divergence is in terms of price peaks and valleys, with wastepaper prices moving up and down long before paper and board produc-

TABLE 8: **North American recycled newsprint projects, 1989-91.**

Company	**Mill/location**	**Capacity[1] (metric tons)**	**Startup**	**Recycled content (%)**
Announced				
Southeast Paper Mfg. Co.	Dublin, Ga.	215,000[2]	1989	95 to 100
Atlantic Packaging Corp.	Whitby, Ont.	136,100[2]	1990	100
Augusta Newsprint Co.	Augusta, Ga.	90,000[3]	1990	25 to 40+
North Pacific Paper Corp.	Longview, Wash.	230,000[2]	1991	25 to 40+
Canadian Pacific Forest Products Ltd.	Thunder Bay, Ont.	100,000[3]	1991	40+
	Gatineau, Que.	182,500[3]	1991	40+
Bowater Inc.	Calhoun, Tenn.	109,500[3]	1991	40
Stone-Consolidated Inc.	n.a.	n.a.[3]	1991	n.a.
Proposed				
MacMillan Bloedel Inc.	Port Alberni, B.C.	n.a.[3]	n.a.	n.a.
	Powell River, B.C.	n.a.[3]	n.a.	n.a.
Fletcher Challenge Ltd.	Crofton, B.C.	n.a.[3]	n.a.	n.a.
	Elk Falls, B.C.	n.a.[3]	n.a.	n.a.
Kruger Inc.	Bromptonville, Que.	n.a.[3]	n.a.	n.a.
Garden State Paper Co.	Northeast U.S.	n.a.[2]	n.a.	100
Smurfit Newsprint Corp.	Northeast U.S.	255,000[2]	n.a.	50+
	Newberg, Ore.	275,000[2]	n.a.	50+
Balaclava Enterprises	Vancouver, B.C.	122,500[3]	1991	n.a.
Great Northern Paper Co.	East Millinocket, Maine	250,000[3]	n.a.	40
Donahue Inc.	Clermont, Que.	n.a.[3]	n.a.	n.a.
Bear Island Paper Co.	Ashland, Va.	n.a.[3]	n.a.	n.a.
Atlantic Packaging Corp.	Whitby, Ont.	n.a.[2]	n.a.	100

1. Adding deinking capacity does not necessarily mean an increase in papermaking capacity.
2. New paper machines.
3. Deinking to be added to existing mills.

Source: *Pulp & Paper Week.*

TABLE 9: **North American newsprint and deinking capacity 1988-2000 (000 short tons).**

	1988		**1992**		**1995**		**1997**	**2000**
	Newsprint	**Deinking**	**Newsprint**	**Deinking**	**Newsprint**	**Deinking**	**Deinking**	**Deinking**
U.S. (23 mills—1992)								
Northeast	546	220	600	350	828	630		
North Central	180	180	350	250	425	340		
South Atlantic	1,057	220	1,310	450	1,562	785		
Sout Central	2,439	0	3,040	200	3,012	640		
Mountain/Pacific	1,881	592	2,500	750	2,568	820		
Total	**6,102**	**1,212**	**7,800**	**2,000**	**8,395**	**3,215**	—	—
Deinked as % of total		19.9%		26%		38%		
Canada (40 mills—1992)								
Maritimes	1,894	0	2,100	—	2,100	295		
Quebec	5,140	0	5,860	400	5,900	970		
Ontario	2,080	210	2,480	400	2,405	600		
Western	1,980	0	3,360	200	3,200	420		
Total	**11,094**	**210**	**13,800**	**1,000**	**13,605**	**2,285**	—	—
Deinked as % of total		1.9%		2%		17%		
Total North America	**17,196**	**1,422**	**21,600**	**3,000**	**22,000**	**5,500**	**6,800**	**9,200**
Deinked as % of total		8.3%		16%[1]		25%	31%	40%

1. Assumes that those mills with deinking facilities are operating at 100% capacity, while the overall industry operating rate will be 87%.

Source: New York State Newspaper Recycling Task Force, Projections from Andover International Associates.

tion takes the same turns. Thus, maintaining supplies of wastepaper is a matter of making prices an incentive to spur collections.

Long term, though, wastepaper prices have been downward in real terms, as has also been the case with market pulp. The highest-quality grades, though, are the exception to this rule in the U.S. Jaakko Pöyry expects that prices for grades such as OCC and high-grade deinking will strengthen relative to other grades and will probably rise in real terms. And prices of ONP and magazines—which will be in abundant supply—will remain depressed, leading more mills to find ways to utilize these grades to a greater degree than they are now.

Overall, though, there is some evidence that prices will be more stable in the future, Jaakko Pöyry notes in its study. Mills will become more involved with the collection of wastepaper through their interests in wastepaper merchants, and new storage systems may reduce price fluctuations.

Throughout the world, wastepaper has common sources and collection systems are largely similar. Basic sources of preconsumer wastepaper are printers and converters. And prime sources of postconsumer wastepaper are retailers, offices, industry, and households.

Preconsumer waste is normally the most valuable, as it is of a largely consistent and often clean quality and is available on a regular basis. Virtually all preconsumer waste is already collected and recycled in the industrialized countries.

Postconsumer waste accounts for the great bulk of all wastepaper collected in every region. The recovery of waste from retailers (principally OCC) is normally quite high, as is the recovery of wastepaper from industry whenever it is suitable for recycling. However, the recovery of office waste is often still low, as is the recovery of household wastepaper—despite current progress with source-separation of ONP and magazines in many countries.

TABLE 10: **Wastepaper prices—major grades ($/short ton, f.o.b. seller's dock, New York).**

	Old newspapers (6)	Corrugated containers (11)	Hard white shavings (30)	Colored ledger (39)
1989				
4Q	$−16.00	$17.50	$355.00	$112.50
3Q	−5.00	20.83	358.33	115.66
2Q	9.16	29.16	358.33	125.00
1Q	17.50	35.00	327.50	127.50
1988				
4Q	35.00	43.33	335.00	119.16
3Q	45.83	55.83	343.33	125.00
2Q	50.00	51.66	323.33	125.00
1Q	58.30	52.50	320.00	122.50
1987				
4Q	55.00	54.17	296.66	112.50
3Q	44.16	70.00	276.66	90.83
2Q	47.50	42.50	276.66	85.83
1Q	40.00	40.00	285.83	78.33
1986				
4Q	25.00	22.50	180.00	79.16
3Q	31.67	45.83	248.33	88.33
2Q	35.00	33.33	210.00	72.50
1Q	30.00	25.00	187.50	72.50
Year-end				
1985	25.00	22.50	180.00	72.50
1984	42.50	37.50	245.00	115.00
1983	42.50	47.50	212.50	112.50
1982	30.00	30.00	200.00	67.50
1981	27.50	27.50	252.50	110.00
1980	45.00	33.00	251.50	127.50

Note: Prices reflect paper and board mill purchase prices, exclusive of delivery charges, and contract rather than premium spot sales. Numbers after each grade correspond to definitions in the current Paper Stock Institute of America Standards & Practices Circular.

Source: *Pulp & Paper Week.*

How will this growth affect the wastepaper business itself? Its structure is certain to change, projects Jaakko Pöyry. The merchant/packer sector will be rationalized. There will be further integration between mills and merchants. In addition, foreign importers will become more involved in the U.S. market. "But the business will be more attractive than in the past and, hopefully, more stable," its study indicates.

Throughout the world, the wastepaper merchants are at the center of the business—collecting, sorting, packing, and marketing wastepaper. They are supported by many small collectors feeding wastepaper in-

> *Overall, though, there is some evidence that prices will be more stable in the future, Jaakko Pöyry notes in its study.*

to merchants' yards and by brokers involved in trading wastepaper rather than collecting and packing.

MILL INVOLVEMENT. Paper and board mills, however, are becoming increasingly involved in the wastepaper business through the acquisition of merchants and specific support of independent merchants. The mills are keen to ensure long-term stability of their wastepaper supplies due to increasing competition, especially in better qualities—hence their interest in acquiring merchant operations. At the same time, stronger financial backing for merchants will improve their ability to invest in new storage and sorting facilities in the future, and with greater control by mills, the demand/supply and price aspects of the wastepaper business may stabilize.

Jaakko Pöyry has forecast the following trends in the structure of wastepaper merchanting in North America:

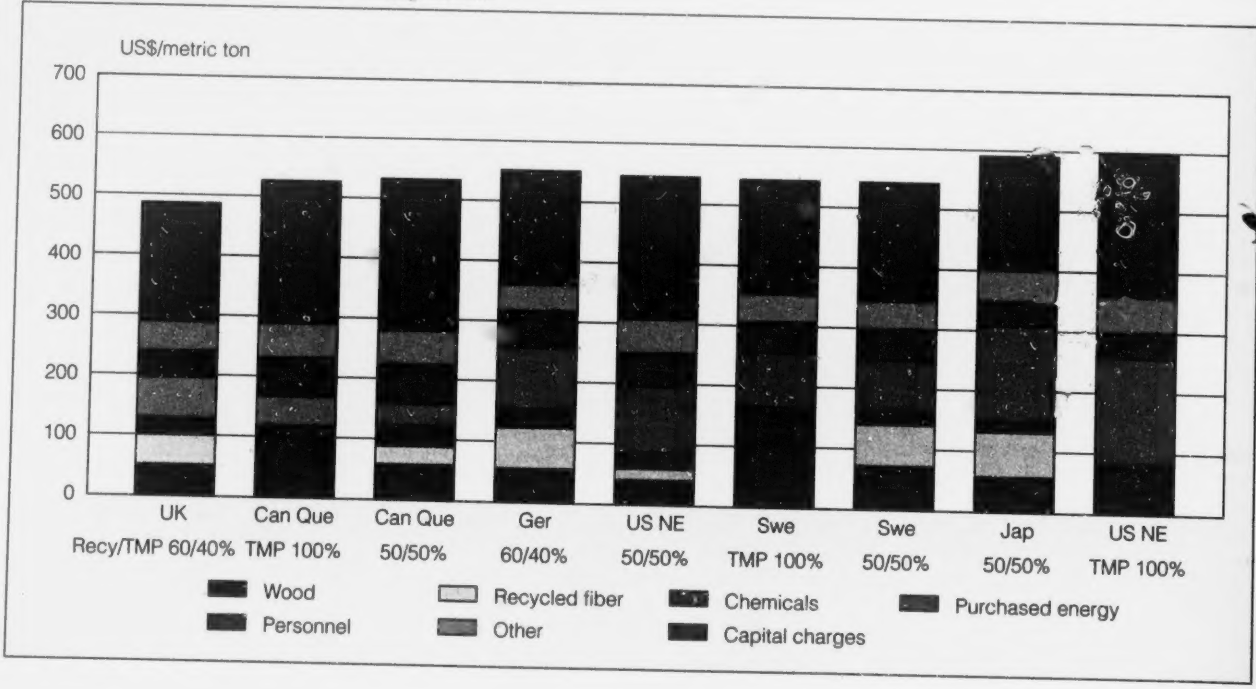
- A limited increase in direct mill ownership of big brokers or merchants in the foreseeable future
- Greater mill involvement with packers—outright control in some cases and special arrangements in other cases
- More foreign buyers will have offices in the U.S., and some could acquire U.S. packers to safeguard their supplies.
- Both municipalities and nontraditional organizations will become more involved with the handling of wastepaper from households.
- Generally, medium-size packers will find life hard and will disappear or be absorbed into bigger groups.

TECHNOLOGY AIDS EXPANSION. Improving technology in the fields of cleaning, deinking, and handling of wastepaper has played an important role in the continuing expansion of wastepaper processing plants and, conversely, can be seen as a major bottleneck for recycled fiber usage as well. But present development work with fiber fractionation and separation handling of those fiber fractions will, in the long term, bring about economically feasible solutions, according to Jaakko Pöyry.

Up-cycling (use of lower-quality wastepaper for production of high-value-added products) has been the major subject of numerous recent technological research efforts. However, to date it has not advanced far enough to be considered economical compared with uses in applications other than primarily industrial.

Hartwig Geginat, president of the European Paper Institute (EPI) and chairman of the executive board of Feldmühle AG, points out, though, that advances in deinking technology alone should enable wastepaper to be upgraded to qualities that were not available just a few years ago. "This should open up completely new fields of application—in the area of superior hygienic paper, for example," Dr. Geginat noted.

FIGURE 2: **Production costs on a new newsprint mill.**



Some key developments in improved secondary fiber processing technology, noted by Jaakko Pöyry, include the following:

- Improvements in stock preparation technology, including deinking, bleaching and fractionation. This is yielding a more homogeneous raw material stock with less impurities and other detrimental particles.
- More technology-driven know how of paper and board mills, enabling them to use specific recycled fiber grades for getting certain properties in end products
- The development of multilayering technology, leading to a more effective use of recycled fiber in different layers of the product, particularly in the manufacture of board and tissue
- Improved runability of the paper machine with a recycled fiber furnish due to modern paper machine technology with closed draws and highly automated process control and measurement, as well as

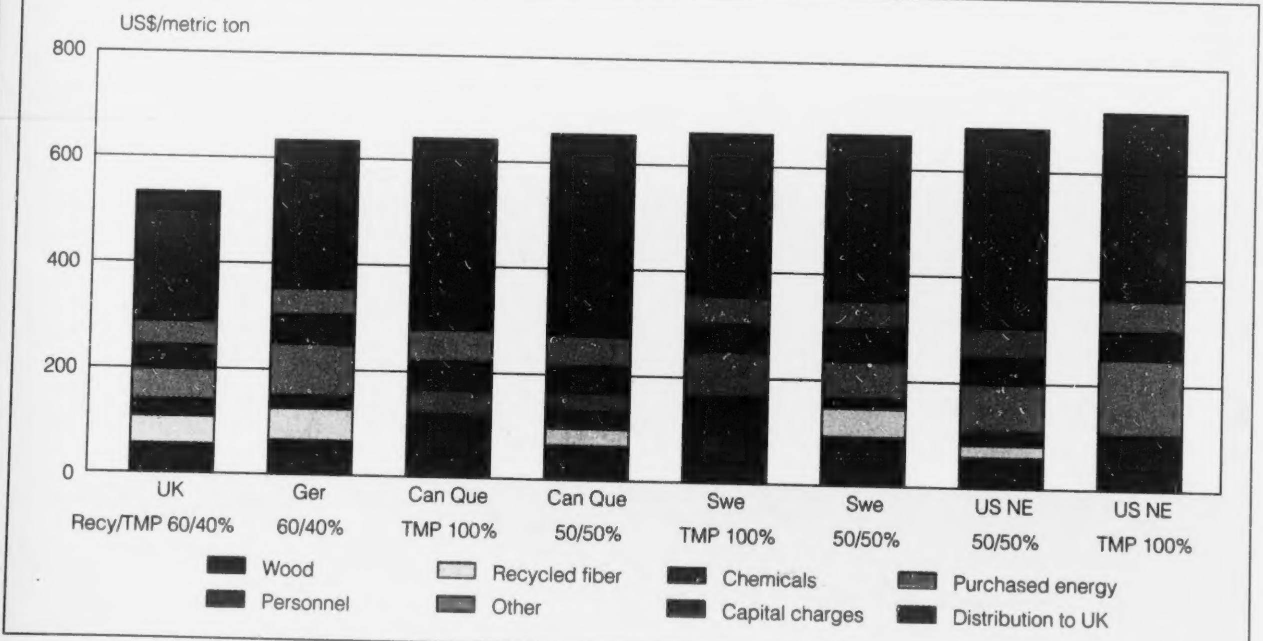
TABLE 12: **U.S. recycled newsprint mills.**

Company	Mill	Capacity (metric tpy)	Recycled content (%)	Publisher equity (%)
U.S.				
F.S.C. Paper Co.	Alsip, Ill.	121,500	100	—
Garden State Paper Co.	Garfield,N.J.	199,500	100	Media General Inc. (100%)
Golden State Newsprint Co.	Pomona, Calif.	122,500	100	—
Manistique Papers Inc.	Manistique, Mich.	56,000	100	—
North Pacific Paper Corp.	Longview, Wash.	704,000[1]	25[2]	—
Jefferson Smurfit Corp.	Newberg, Ore.	350,000	50	The Times Mirror Co. (20%)
	Oregon City, Ore.	217,000	50	The Times Mirror Co. (20%)
Southeast Paper Manufacturing Co.	Dublin, Ga.	415,000[3]	95	Cox Enterprises Inc. (33⅓%) Knight-Rider Inc. (33⅓%) Media General Inc. (33⅓%)
Stone Container Corp.	Snowflake, Ariz.	264,100	60	—
Canada				
Atlantic Packaging Corp.	Whitby, Ont.	136,100[4]	100	—
Quebec & Ontario Paper Co.	Thorold, Ont.	310,000	55	Tribune Co. (100%)

Sources: Newsprint Information Committee, *Pulp & Paper Week.*

1. Includes new 230,000-tpy machine starting up in late 1991.
2. Estimated net recycled content among mill's three paper machines.
3. Includes new 215,000-tpy machine started September 1989.
4. New 136,100-tpy machine starting up mid-1990.

FIGURE 3: **Production costs and delivery to U.K.**



cleaning equipment

- Advances in coating technology and use of pigments. These developments, together with the improved smoothness and surface properties of a recycled-fiber basesheet, will contribute to the increased use of coating, especially in the manufacture of cartonboard.
- Soft-calendering to improve surface properties, especially with a deinked pulp furnish in newsprint manufacture.

Present papermaking technology allows increased use of recycled fiber in standard newsprint (up to 70% without problems in product quality), linerboard and fluting, tissue, and also some cartonboard and packaging paper grades. To a limited extent, the present technology also allows for the use of secondary fiber in uncoated free-sheet grades, coated free-sheet, lightweight coated and supercalendered paper, liquid packaging board, and foodboards.

At Atlantic Packaging Products Ltd.'s Whitby, Ont., mill, a 134,500-metric-tpy newsprint machine that is scheduled to start up late in 1990 is using both washing and flotation in its deinking system. The two-process system is rare in North America (although popular in Europe and Japan) but is becoming the new trend in deinking, as it can process both ONP and coated magazine paper and produce fiber with some beneficial characteristics.

Flotation technology is being used at Smurfit Newsprint Co.'s Oregon City, Ore., mill, Atlantic Packaging's Scarborough, Ont., tissue mill, and Stone Container Corp.'s Snowflake, Ariz., newsprint mill.

HURDLES REMAIN. The primary technical bottlenecks limiting the use of recycled fiber, as specified by Jaakko Pöyry, include the following:

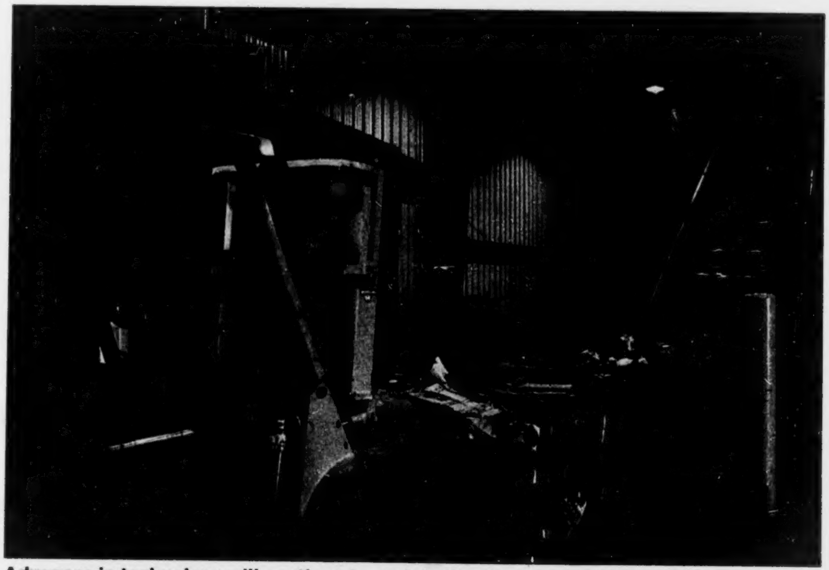
- The high-brightness requirements in printing paper, which make bleaching costs for recycled grades cost-prohibitive. Consumers may have to accept a gray shade.
- The lower-strength properties found in recycled grades. As recycling grows, this will be a problem as stronger fibers will be scarcer.
- The aging and yellowing of recycled grades due to high mechanical pulp content. This will cause more problems in maintaining archives for libraries, etc.
- The higher prevalence of stickies, resulting in greater incidence of mechanical problems on the paper machine. This will, potentially, lower operating efficiencies and raise operating costs.
- Environmental concerns caused by the effluents from deinking, including heavy metals, etc. Costs associated with pollution abatement at these mills can be high.

Wastepaper use and processing has a sound environmental basis. It helps to minimize the amount of solid waste by recycling a portion of it. Some of this can be sorted and handled in such a way as to save forests, water, and energy. However, it also generates environmental problems.

The heavy metals in ink waste, one environmental problem, come from certain printing colors. One solution is to substitute organic colors. A second problem is disposing of deinking waste and other wastepaper processing rejects. A possible solution is an incineration system that would optimize the heat economy of wood and waste firing at the same mill. The third environmental concern is landfill disposal of waste from ash after incineration and possible ground-water contamination. Some deinking waste currently is being used for composting.

WOODPULP VS RECYCLED FIBER. Cost-competitiveness has played a major role in the increased use of recycled fiber, especially in newsprint and tissue manufacture in Western Europe. In North America, though, newsprint production based on recycled fiber will be driven more by environmental legislation than by cost-competitiveness.

The low cost of old and overissue newspapers and magazines, however, would give a U.S. Northeast producer using 50% recycled fiber and



Advances in technology will continue to sustain the strong growth in wastepaper demand in paper and paperboard production. (Photo courtesy of Inland Container Corp.)

50% thermomechanical pulp (TMP) a production cost advantage of roughly $40/metric ton compared with a 100% TMP-based newsprint producer in the same region, according to Jaakko Pöyry's estimates (Figure 2).

A Canadian producer in Quebec with a very low energy price and reasonable wood costs would have approximately the same production costs with 100% TMP compared with 50% TMP and 50% recycled fiber (imported from the U.S. Northeast) in the newsprint furnish. However, the Quebec producer would be cost-competitive both in the U.S. Northeast markets (against U.S. producers) and in deliveries to the U.K. (against the Swedish producers) with current exchange rates (Figure 3).

The implications of the increased utilization of recycled fiber for paper and board producers throughout the world are many and involve both opportunities and threats. In general terms, the growing use and acceptability of recycled fiber will allow mills to reduce production costs but will involve significant investment in wastepaper handling, cleaning, deinking, and bleaching equipment, which will often be an additional cost. Jaakko Pöyry expects that there will also be an important marketing opportunity in explaining and capitalizing on the environmental benefits of using recycled-fiber-based grades.

With strong growth in demand and a greater interest on the part of its customers in securing supplies of the correct grades, the wastepaper business has a very bright future. The major threat to the business is that of oversupply of certain grades generated by mandatory separation and collection in North America and potentially in Western Europe. If the market becomes oversupply driven, there is a danger of price and structural breakdown.

Growth in wastepaper demand will spur demand for wastepaper processing equipment and chemicals also. Demand for deinking lines will be particularly strong, noted Jaakko Pöyry. By 2001, 31 million metric tons of wastepaper will be deinked globally, up from about 11 million metric tons currently. Improvements in cleaning and fiber upgrading equipment will show strong growth. Equipment manufacturers increasingly will be looking at the consequences of using recycled fiber on paper machines. ■

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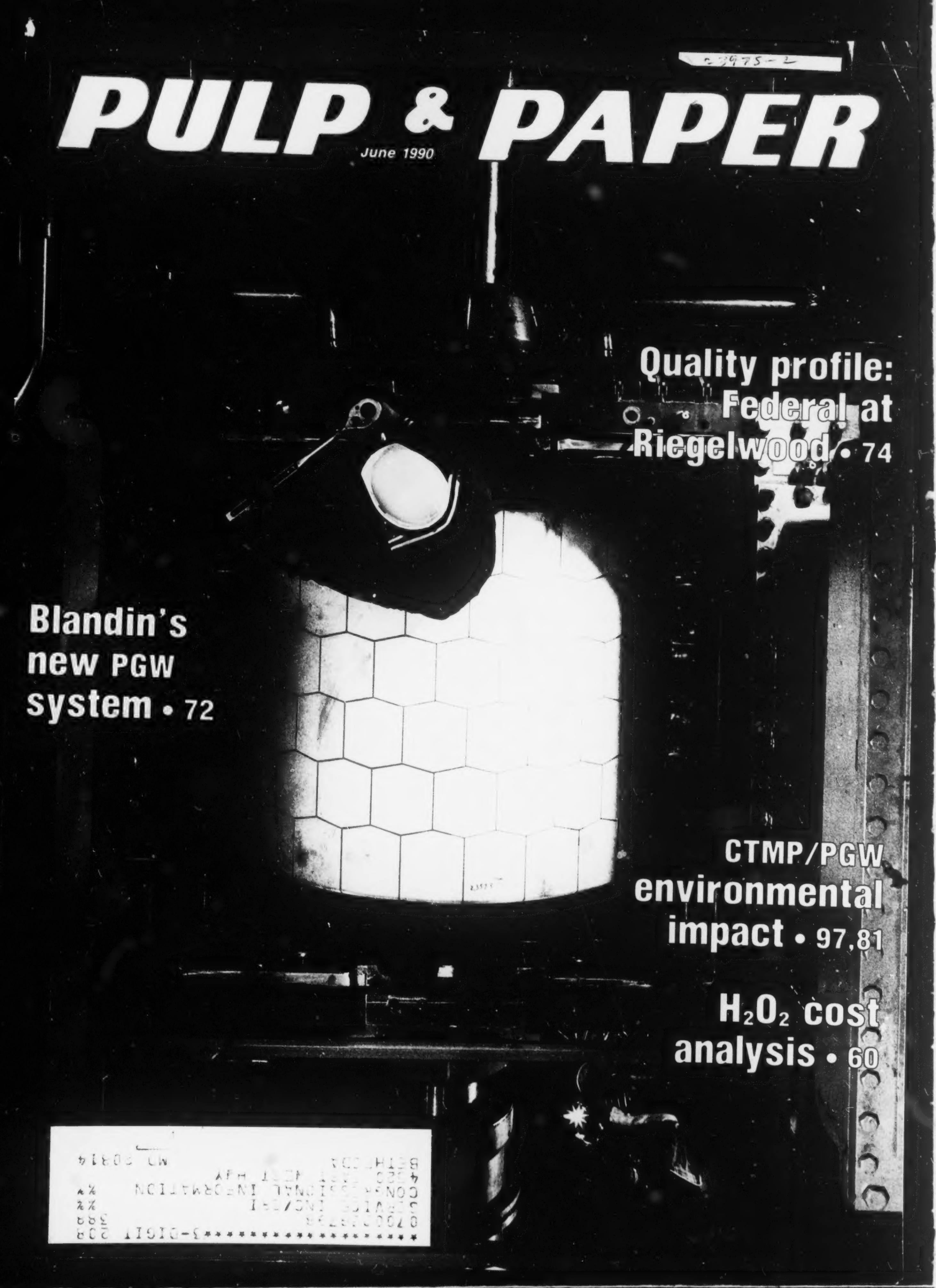

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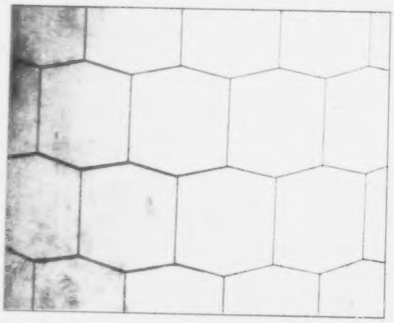

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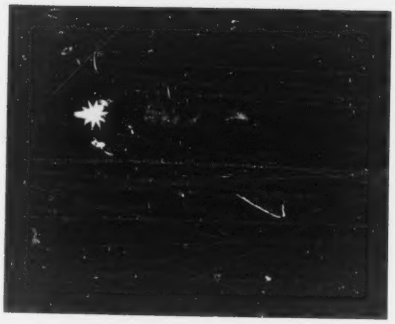

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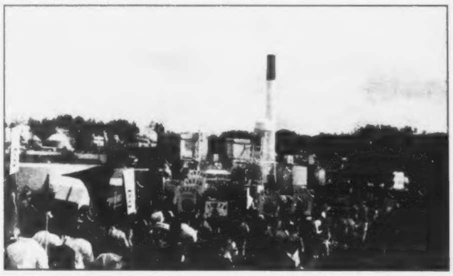

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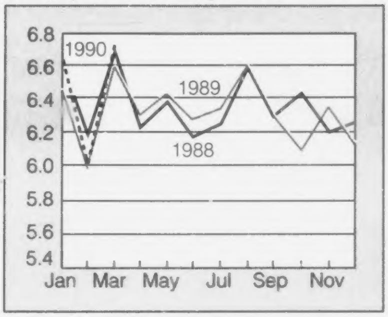
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.7 million tons in March, an increase of 1.3% over the same month last year, according to American Paper Institute data. The seasonally adjusted rate of production in the first quarter was 77.7 million tpy, 1.4% higher than the year-earlier rate. Through March, mills produced paper at a seasonally adjusted rate of 39.2 million tpy, up 2.4%, and paperboard at 38.4 million tpy, up 0.3%.

Among major grades, newsprint was responsible for most of the gains in the paper sector, reflecting the recent startup of new capacity. Uncoated groundwood continued to lead the printing and writing grades, which overall were up 2.8% in the first quarter. A 7.8% increase in production of containerboard for export was barely enough to offset a 0.1% decline in production for the domestic market, leading to an overall gain of 0.5% through March. The situation is similar for boxboard, with export production up 11.7% but output for domestic use up just 0.8%.

Canadian newsprint shipments totaled 825,000 metric tons in March, up 2.7% from last year, but pulp shipments dropped 11.5%, to 690,000 tons. Operating rates were 95% at newsprint mills and 88% at market pulp mills. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Mar.	543	5.2	6,422	9.3
Uncoated groundwood (s)	Mar.	160	8.8	1,832	6.7
Coated paper (s)	Mar.	616	2.0	7,349	2.5
Uncoated free-sheet (s)	Mar.	1,008	0.5	11,734	2.4
Other printing/writing	Mar.	145	4.3	1,646	11.8
Total packaging and other paper (s)	Mar.	412	-5.5	4,826	-5.5
Tissue	Mar.	492	-2.2	5,669	0.9
Total paper	**Mar.**	**3,375**	**0.8**	**39,477**	**2.4**
Unbleached kraft paperboard	Mar.	1,714	3.6	19,747	2.0
Semichemical medium	Mar.	485	-3.6	5,619	-2.7
Bleached paperboard	Mar.	388	-1.0	4,510	1.2
Recycled paperboard	Mar.	765	3.4	8,775	-1.3
Total paperboard	**Mar.**	**3,352**	**1.9**	**38,651**	**0.5**
Total U.S. paper and paperboard output	**Mar.**	**6,727**	**1.3**	**78,128**	**1.4**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Feb.	4,989	3.5	62,811	1.9
Market pulp production	Feb.	660	-3.9	8,579	-2.3
Wastepaper consumption at paper/board mills	Feb.	1,618	8.0	20,313	5.0
Pulpwood consumption (cords)	Feb.	8,108	3.5	99,966	2.9
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Mar.	26.667	-0.9	78.443[6]	0.8
Containerboard inventories at U.S. box plants and mills	Mar. 1	2,559	-2.0		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Feb.	1,033	3.2	12,876	3.6
Imports of Canadian newsprint	Feb.	688	11.1	8,300[6]	5.7
U.S. paper exports (including products)	Feb.	499	-4.8	6,484	12.3
Exports of unbleached kraft linerboard	Feb.	186	-5.1	2,434	14.1
Exports of woodpulp	Feb.	410	-19.1	4,981	-13.9
Norscan pulp inventories[4]	Mar. 31	1,392	83.2		
Norscan pulp operating rates[4]	Mar.	85%	94%	96%	91%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Mar.	825	2.7	2,259[6]	-0.8
Operating rates	Mar.	95%	95%	94%	98%
Inventories held by U.S. consumers	Mar. 31	1,267	-11.2		
Other paper/board shipments	Mar.	647	9.3	1,813	6.8
Woodpulp shipments (export only)	Mar.	690	-11.5	1,914	-9.8
Operating rates	Mar.	88%	95%	90%	97%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Recycled paperboard: Producers add capacity to meet rising demand for recycled packaging

Grade Structure: Recycled boxboard is made primarily from secondary fiber or wastepaper and is produced on either a fourdrinier, a multi-ply, or a cylinder paper machine. Grades include folding boxboard, corrugating medium, linerboard, gypsum liner, and core/can/tube stock.

Markets: The market demand for recycled paperboard grades, as measured by their 1990 capacity share, is folding boxboard, 26.3%; setup boxboard, 3.0%; corrugating medium, 21.9%; gypsum linerboard, 14.0%; linerboard, 5.6%; container chipboard and filler board, 0.4%; and core/can/tube stock and other converting grades, 28.8%.

Production/Capacity: Production declined 0.4% to 8.754 million short tons in 1989. Demand has been somewhat weak in early 1990 due to weakness in containerboard and gypsum liner grades. Total recycled boxboard production was down about 1.3% in the first three months of 1990 compared with a year earlier.

The projected increase in capacity for recycled paperboard for 1990-92 is more than double the increase during the past three years. Current producers, as well as new entrants into the industry, will add 1.193 million tons of capacity to the 1989 base of 9.612 million tons. Containerboard grades will account for 75%, or 944,000 tons, of the new capacity.

These major expansions will outpace demand growth this year and perhaps again next year. Therefore, total industry operating rates are expected to drop to about 85% of capacity. However, mills producing folding boxboard and other consumer packaging grades should enjoy much higher operating rates.

Outlook: Total demand for recycled paperboard continues to be depressed by the weakness in the containerboard and gypsum liner grades. In 1989, recycled linerboard production dropped 4.7%, corrugating medium dropped 1.8%, and gypsum liner dropped 7.9%. Some improvement in recycled containerboard demand is expected in second-half 1990, but prices are forecast to remain depressed. The weakness in gypsum liner grades is expected to continue, and little likelihood of a rebound in 1990 exists since new housing starts and commercial construction are both expected to remain depressed.

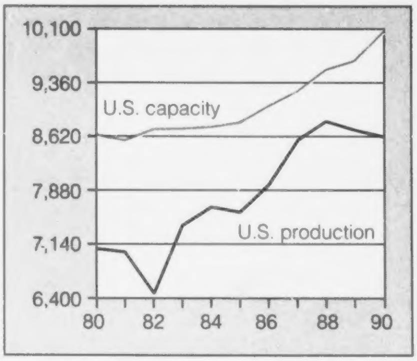
Production of recycled folding boxboard increased about 2.0% in 1989, and the industry fully utilized capacity to meet rising demand for recycled carton stock. Production reached 2.40 million tons last year and is forecast to reach 2.50 million tons this year. Higher demand for recycled boxboard has been fueled by the promotion of recycling and price competition with bleached and unbleached kraft boxboard grades.

Production of core/can/tube stock increased about 3.7%, or 50,000 tons, in 1989. Market growth will be flat this year due to weaker demand for the industrial converting grades and lower U.S. retail sales. The core/can/tube grades are used in a variety of consumer packaging applications in addition to their industrial uses.

Prices: Manufacturers successfully raised market prices for recycled boxboard grades in the first quarter, following a full year with no price increases. The benchmark price for clay-coated newsback (CCNB), which is widely used in folding cartons, increased $35/ton to between $515 and $545/ton. Prices of uncoated grades increased $25/ton to between $365 and $385/ton. Recycled boxboard prices will continue to be sharply lower than the $830/ton price of solid bleached sulfate or $620/ton for coated kraft.

Historical prices for clay-coated 20-pt folding carton boxboard (rolls, $/short ton, year-end prices): 1980, $380; 1981, $400/425; 1982, $380/425; 1983, $370/425; 1984, $375/425; 1985, $350/400; 1986, $380/420; 1987, $390/415; 1988, $480/$510; 1989, $480/$510. Bending 20-pt chipboard (rolls, $/short ton, year-end prices): 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; 1984, $300; 1985, $300; 1986, $320; 1987, $320; 1988, $340/$360; 1989, $340/$360. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	**1988**	**1989**	**1990e**
Production[1]	8,789	8,754	8,615
Capacity[1]	9,532	9,612	10,029
Utilization rate	92.2%	91.1%	85.9%
Imports	95	100	85
Exports	72	34	44
Apparent U.S. consumption	8,812	8,820	8,656
lb/capita	71.85	71.74	69.25
GNP ratio	2.25	2.25	2.20

e = *Pulp & Paper* 1990 estimate.

1. American Paper Institute production, capacity data—1988, 1989 revised.

2. 000 tons/$ billion real GNP.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity (000 short tpy)	**Market share (%)**
1. Jefferson Smurfit Corp.	1,330	13.3
2. The Newark Group Inc.[1]	875	8.7
3. Sonoco Products Co.	850	8.5
4. Caraustar Industries Inc.	550	5.5
5. Rock-Tenn Co.	532	5.3
6. Inland Container Corp.	475	4.7
7. Waldorf Corp.	395	3.9
8. U.S. Gypsum	332	3.3
9. National Gypsum Co.	220	2.2
10. Packaging Corp.	210	2.1

Market share of top five companies:
38.0%
Market share of top ten companies:
57.5%
Total U.S. capacity (1990):
10.029 million short tons

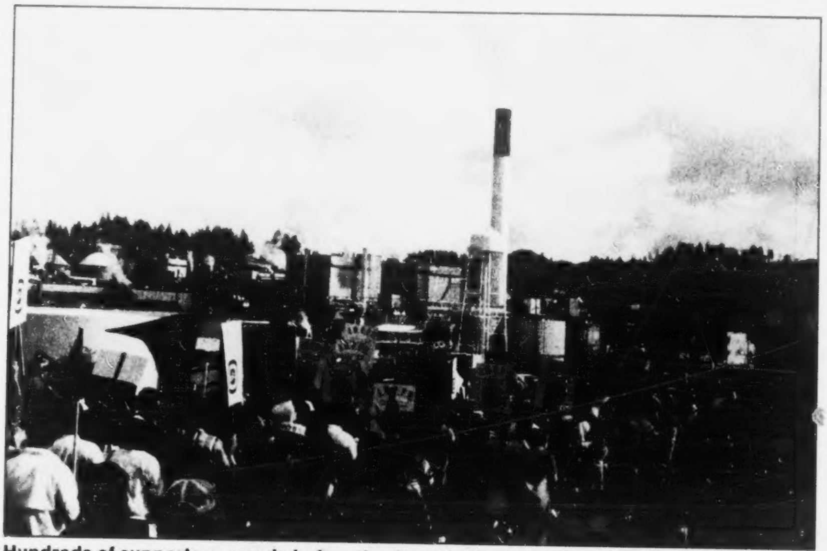
1. Acquired National Gypsum's Stockton, Calif., mill in 1989.

it argued were necessary for the future competitiveness of the mill. No sale negotiations were going on as of mid-May, but Odgers added that it was "in the interest of both parties if it is sold as an operating facility."

"I think the wage increase should have been higher," said AWPPW Oregon representative James P. Thompson, "but we got them off their takeaways." Thompson commented that Toledo workers were pleased about G-P's plans to sell the mill. "The people there really are bitter against the company," he said. Although workers were expected to return to the mill May 9, most employees were staying off the job for perhaps another week. The new contract includes job protection and successor language, and the new owner of the facility will be obligated to accept the labor force, he said.

Meanwhile, members of four trade unions at G-P's pulp and paper mill in Baileyville, Maine, approved a four-year pact last month after three years of negotiations. More than 220 carpenters, machinists, and aerospace and electrical workers had been under implemented terms since August.

- Members of AWPPW rejected a five-year contract offer at five Weyerhaeuser Co. paper mills in Washington and Oregon by a vote of 846 to 644. Union negotiators referred the offer without a recommendation, and terms of the proposal were not disclosed. The current three-year pact expired Mar. 15 and was to be extended, Weyco officials said. The company was seeking a pact two years longer than usual to extend stability at the mills, located in Everett, Cosmopolis, and Longview, Wash., and Springfield and North Bend, Ore. Both sides were scheduled to meet in mid-May. ■



Hundreds of supporters parade before the Georgia-Pacific mill Apr. 21 in Toledo, Ore. (Photo courtesy of *The Rebel.*)

SALES AND EARNINGS

Profits drop 22% in U.S., plummet 69% in Canada

North American paper industry earnings continued to spiral downward as U.S. and Canadian producers suffered from prolonged weak newsprint and market pulp markets and eroding containerboard and corrugated box prices. A *Pulp & Paper* survey of first-quarter 1990 profits of 30 U.S. companies showed a 22.5% drop from year-earlier earnings, while 16 Canadian companies reported an overall 69.0% plunge. U.S. sales for the quarter ending Mar. 31 improved 7.0%, but Canadian sales stagnated, increasing a scant 0.5%. The latest figures had many CEOs shaking their heads and wondering aloud when the down cycle would end.

As the newsprint market seemed finally to bottom out, with hopes increasing that a June 1 price increase would stick, other markets weakened, namely market pulp and paperboard packaging. The bright spot remained tissue grades, where at least two major producers were able to increase overall company profits. Higher prices for timber and wood products also helped bolster profits of some U.S. companies with operations in the Pacific Northwest. But overall, only a half dozen U.S. paper companies and one Canadian company were able to post higher profits in the first quarter. The industry's after-tax profit margins on a year-to-year basis narrowed to 5.3% from 7.4% in the U.S. and to 2.1% from 6.9% in Canada.

Downward trend continues. The decline in the U.S. industry follows a relatively flat performance in third-quarter 1989 and a 4.4% decline in fourth-quarter 1989. The latest drop ends over three years of sometimes spectacular paper industry earnings growth. The last negative year-to-year comparison in U.S. pulp and paper industry earnings took place in first-quarter 1986.

International Paper Co. reported that the most significant price declines were for paper pulps and uncoated printing/writing paper and manufacturing costs rose at some mill locations because of higher wood prices. Net income for Georgia-Pacific Corp. tumbled 34% on a 9% increase in sales. The results were the first to include Great Northern Nekoosa Corp., which G-P acquired in March. G-P said building products profits increased 16% while pulp and paper products dropped 26% due to softer prices. Weyerhaeuser Co. said it expects the rest of 1990 to provide "relatively firm domestic building materials markets and strong export markets for logs and building materials." Discounting in the domestic newsprint market was a factor in the company's 12% drop in first-quarter profits.

Strong log and wood products markets also helped offset weaker pulp and paper profits at Louisiana-Pacific Corp. and Willamette Industries Inc., which posted a 7% rise in profits to $42 million. "The bad news is there will be a severe shortage of logs in the Northwest," said Willamette chief financial officer Jerry A. Parsons. "But the good news is that prices will be forced up, and the value of our timberlands will increase."

Printing/writing weak. Uncoated paper prices have dropped about 20% from a high last spring, but an Apr.

1 price hike created some tightening in the market. Boise Cascade Corp. profits plunged as weak demand for printing/writing paper and newsprint grades coupled with higher prices for logs and woodchips. Bowater Inc. was affected by increased price discounting and higher operating costs associated with startup expenses. Demand for lightweight coated printing paper for magazines and newspaper inserts strengthened for Consolidated Papers Inc., but there has been some weakening in demand for higher-quality, heavyweight coated paper sold in sheets.

Champion International Corp. included price discounting on many of its paper grades plus major outages for expansion projects at several mills as reasons for a 35% decline in first-quarter profits. James River Corp. suffered a 20% drop in profits in its third quarter ending Jan. 28. The company cited lost production caused by last winter's extreme weather and the shutdown of a paper machine at the Fitchburg, Mass., specialty paper mill. Weak prices for copier and office paper hurt Mead Corp.'s earnings at a time when the company is pumping capital into its new Cycolor color imaging business.

Paperboard market weak. Containerboard producer results weakened in the first quarter due to increased price discounting, which spread to corrugated boxes. Union Camp Corp. blamed lower earnings on low prices for its linerboard and uncoated business paper. Stone Container Corp. suffered a 57.6% plunge in first-quarter profits to $36.8 million, which the company said reflected softening prices for newsprint, linerboard, and market pulp. "It is clear that 1990 will be a difficult year," noted chairman and CEO Roger Stone, but he expressed hope that a newsprint price increase would soon take effect. Gaylord Container Corp. reported a net loss of $12.5 million in its second quarter ending Mar. 31., compared with a $6 million profit in 1989. The company cited higher fiber costs, rebuild of a California paper machine, and plant consolidation expenditures. Although Chesapeake Corp.'s income plummeted 65%, the company said second-half earnings would be up, "perhaps even doubling" first-half results.

A reduced tax rate and improved bleached board operation boosted Temple-Inland Inc.'s profits, while a drop in southern pulp prices and the shutdown of a recycled paperboard mill for modernization hampered Federal Paper Board Co. Potlatch Corp. highlighted an increase in tissue product shipments and wood products group success for a 3% rise in income. The company expects to see softening pulp markets and has scheduled maintenance downtime.

Tissue stays strong. Record operating results were reported by Kimberly-Clark Corp. in the first quarter, with net income of $117 million, up 14% from 1989. CEO Darwin E. Smith said manufacturing cost reductions and decreases in marketing expenses in several consumer lines contributed to the improvement. The company was hurt by weak newsprint markets and currency translation losses at its Brazil operations. Production difficulties at the S.D. Warren printing and publishing paper division undermined a strong quarterly performance by Scott Paper Co.'s tissue operations, which saw a 7% increase. Dollar sales established an all-time high. In Europe, Scott said it expects to see cost reductions, especially in the U.K., where it will trim its labor force by as much as 30%. Scott Paper Ltd. was the only Canadian company in the *Pulp & Paper* survey that showed any profit increase from first-quarter 1989, posting a 3% rise in income on a 58% jump in sales. The sales increase reflected its purchase of the White Swan Div. of E.B. Eddy Forest Products last year. The company was

U.S. paper industry results.

	First quarter ($000)			
Companies	**Sales 1990**	**Change 1990/89**	**Earnings 1990**[1]	**Change 1990/89**
Badger Paper Co.	$18,992	−2.4%	$589	−55.6%
Boise Cascade Corp.	1,066,030	−3.0	33,570	−57.1
Bowater Inc.	338,300	−5.7	22,200	−42.9
Champion Intl. Corp.	1,284,406	−0.3	69,774	−38.5
Chesapeake Corp.	203,617	8.3	4,431	−65.5
Consolidated Papers	240,387	−0.8	40,331	−7.1
Federal Paper Board Co.	316,810	11.3	38,786	−17.6
Fort Howard Corp.	266,910	7.3	(29,242)	−18.0
Gaylord Container Corp.	161,500	−9.3	(12,500)	nm
Georgia-Pacific Corp.[2]	2,659,000	8.7	101,000	−34.4
P.H. Glatfelter Co.	158,507	2.0	19,964	−18.1
International Paper Co.	3,200,000	23.1	180,000	−19.3
James River Corp. (1/28)	1,433,073	3.4	46,946	−20.4
Kimberly-Clark Corp.	1,573,300	10.7	117,200	13.7
Longview Fibre Co. (1/31)	166,851	−1.8	12,929	−33.1
Louisiana-Pacific Corp.	474,080	1.5	35,800	−10.3
Mead Corp.	1,141,400	1.1	39,500	−24.9
Mosinee Paper Corp.	56,354	−4.1	2,882	−66.7
Pentair Inc.	286,391	4.2	5,651	−37.3
Pope & Talbot Inc.[2]	149,054	1.9	11,022	16.8
Potlatch Corp.	326,722	9.9	37,007	3.0
Scott Paper Ltd.	1,296,000	2.1	60,100	−30.5
Sonoco Products Co.	403,526	−6.8	24,812	1.0
St. Joe Paper Co.	161,042	0.3	12,410	−26.6
Stone Container Corp.[2]	1,453,700	28.9	36,800	−57.6
Temple-Inland Inc.[2]	591,200	24.9	62,200	14.1
Union Camp Corp.	701,489	−0.7	67,407	−15.4
Wausau Paper Mills (2/28)[2]	80,070	6.0	5,735	−47.3
Westvaco Corp. (1/31)	585,493	5.6	46,438	−4.5
Weyerhaeuser Paper Co.	2,282,503	−1.7	130,058	−12.2
Willamette Industries Inc.	469,889	7.3	42,437	6.6
Total	**$ 23,546,557**	**6.9%**	**$1,266,245**	**−22.6%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years where possible. 2. **Fort Howard:** Income includes loss in equity of net loss of unconsolidated units in current and previous quarters. **Georgia-Pacific:** 1990 results include results of Great Northern Nekoosa, acquired on Mar. 8. **Pope & Talbot:** 1990 income includes a gain of $1.9 million on the sale of timberland. **Stone Container:** Sales increase reflects inclusion for a full period of Stone-Consolidated Inc. The year-earlier period included only those results for one month. **Temple-Inland:** 1989 results restated to reflect discontinued operations. 1990 net income includes $1.7-million gain from property and equipment. **Wausau Paper:** 1990 net income includes life insurance proceeds of $1.9 million. ( ) = losses. nm = Not meaningful.

looking forward to lower market pulp prices but remained wary of rising interest rates on the increased debt incurred in the White Swan acquisition.

Canadians in a spiral. The latest plunge in Canadian profits follows a 65% drop in the fourth quarter of last year as the industry continued to reel from newsprint, reduced pulp shipments, and a strong Canadian dollar. The industry also faces difficult labor negotiations involving over 30,000 workers in the eastern provinces and increasingly tougher and more expensive environmental regulations. Poor performance in the groundwood and coated paper division and liquidation of its office products business added to the newsprint woes of Abitibi-Price Inc. The company's first-quarter losses totaled $11 million, down from a $26-million gain in first-quarter 1989. Abitibi said that even though the June 1 newsprint price hike was a step in the right direction, newsprint earnings are expected to remain below acceptable levels until continuing additions to industry capacity are reduced or further machine closures are undertaken. Abitibi's president has speculated some of the company's marginal newsprint mills will eventually be converted to the production of higher value-added products. "Canada has tended to use its trees for the lowest-value product that it can make," said Ronald Oberlander at the annual meeting last month in Toronto, Ont. Abitibi must focus on newsprint mills that will be "long-term players," he said.

Canadian Pacific Forest Products Ltd. likewise took a beating on newsprint, its principal product, and also cited lower market pulp shipments for its 93% dive in profits. However, CEO Cecil Flenniken said he is bullish on the price outlook of northern bleached softwood kraft woodpulp (NBSK), which makes up 90% of the company's pulp production.

Another company anticipating the June 1 increase is MacMillan Bloedel Ltd. The company also cited higher interest rates, contractual cost increases, and production cutbacks as behind a 59% slump in profits on a 3% decrease in sales. Despite a 90% plunge in first-quarter income, Noranda Forest Inc. said the balance of 1990 should show a recovery for newsprint and other paper grades. Noranda completed a cycle of asset renewals begun in the mid-1980s, but markets were delicate for paperboard packaging and market pulp.

"We don't really see any signs of a near-term turnaround," commented Domtar Inc. chairman and CEO James Smith at the company's annual meeting. "I would be less than honest if I said I exude confidence about Domtar's short-term prospects." Sales of Domtar's fine paper increased 13%, but market pulp, newsprint, and groundwood specialty paper declined by 19%. Canfor Corp. blamed a nearly 57% decline on lower pulp shipments and a higher Canadian dollar. Chairman and CEO Peter Bentley said the company curtailed kraft pulp production 15% in the first quarter and expects to maintain or increase downtime in the second quarter, which he said would "probably be the toughest" of the year with improving market conditions likely in the second half. He said production curtailments, which have also been announced by other producers, will allow current prices to hold for NBSK. ■

Canadian paper industry results.

	First quarter (C$000)			
Companies	**Sales 1990**	**Change 1990/89**	**Earnings 1990[1]**	**Change 1990/89**
Abitibi Price Inc.[2]	$784,800	−3.1%	$(11,300)	−143.0%
Canadian Pacific Forest Products Ltd.	642,100	−9.7	4,800	−92.6
Canfor Corp.[2]	239,700	18.5	13,100	−56.6
Cascades, Inc.	196,352	21.1	3,687	−49.7
Doman[2]	158,938	138.2	4,368	−1.1
Domtar Inc.[2]	611,000	−1.9	20,000	−23.1
Donohue Inc.	158,200	−4.5	10,000	−31.0
Fletcher Challenge Canada Ltd.	282,200	−15.9	15,700	−56.5
MacMillan Bloedel Ltd.	781,300	−3.2	30,000	−59.1
Noranda Forest Inc.	1,210,000	0.7	6,000	−89.7
Perkins Papers Ltd.[2]	18,516	12.5	735	nm
Repap Enterprises Corp.	293,500	11.1	7,000	−71.7
Rolland Inc.	108,800	−6.6	174	−80.8
Scott Paper Ltd.[2]	130,017	57.6	4,370	3.0
Tembec Inc. (2nd Q)	55,699	−11.3	4,712	−42.3
Weldwood of Canada Ltd.	160,000	−17.7	6,300	−61.1
West Fraser Timber	140,600	17.3	4,900	−16.9
Total	**$5,971,922**	**0.5%**	**$124,546**	**−69.0%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years. 2. **Abitibi-Price Inc.:** Current quarter includes a pretax charge of $13.7 million mostly from the write-off of the Jaffe office products business, which is being liquidated. **Canfor Corp.:** 1990 sales increase reflects the mid-1989 acquisition of Balfour Forest Products Inc. **Doman Industries:** Results include those of Western Forest Products Ltd. and Western Pulp Ltd. Partnership, both acquired in July 1989. **Domtar Inc.:** Income from discontinued operations includes an after-tax gain of $23 million from the sale of assets of its salt unit in March. **Perkins Papers Ltd.:** Year-earlier results reflected mechanical problems at the Candiac, Que., mill. **Scott Paper Ltd.:** Sales increase reflects purchase of the White Swan Div. of E. B. Eddy Forest Products, which was not reflected in year-earlier results. ( ) = losses. nm = Not meaningful.

MARKET PULP

Consolidated studies further pulp expansion

Consolidated Papers Inc. is conducting a preliminary feasibility study of another major pulp mill expansion to reduce outside chemical market pulp requirements, according to its annual report. Historically, the company has tried to produce about 75% of its chemical pulp internally. Chemical market pulp requirements, however, are expected to increase sharply following the startup of two new coated paper machines in late 1990 and late 1991.

To achieve the goal of expanding the Kraft Div.'s capacity to 1,000 tpd, an additional $10 million will be spent this year to remove bottlenecks in hardwood bleaching, chip feed to the pulp digester, and pulp wet lapping. Last year, the Kraft Div. produced 257,780 tons, or 66% of the chemical pulp required for Consolidated's four paper mills, a 13% increase over the previous year. ■

Supply and demand of ONP

Demand for products made from old newspapers (ONP) has grown steadily over the past ten years. However, can the growth in demand for ONP match the current rapid growth in ONP collection?

ONP is top on the list of recycling collection materials for municipalities. This highly recyclable material presently makes up 7% of landfills and is easily segregated from other household solid waste. However, the recent increase in collection has caused a glut of ONP in some places, bringing a steady decline in market prices.

Newsprint consumption and, therefore, the supply of ONP has risen steadily over the past decade at a rate of 2.4% annually. In 1988, 13.6 million tons of newsprint were consumed in the U.S., of which 35% was recycled. This compares with approximately 11.2 million tons of newsprint consumed in 1979, of which only 28% was recycled.

DEMAND. The end users for ONP in the manufacture of paper and paperboard products include producers of newsprint, tissues and towels, paperboard boxes, construction paper, and board. Other uses include molded pulp products (egg cartons), cellulose insulation, animal bedding, and mulch products. ONP exports have been used primarily in the manufacture of newsprint by overseas producers and have been growing substantially over the past ten years. As the table illustrates, total ONP consumption has increased since 1979.

Domestic demand for ONP has grown most rapidly and consistently in newsprint (109%) and tissue and towel manufacture (73%), although the magnitude of ONP use by the tissue and towel sector is considerably less than the newsprint sector.

Once the leader in recycled ONP use, recycled paperboard manufacture has exhibited little variation in ONP utilization over the past decade. This is due largely to the emergence of two competing grades of paperboard—coated bleached and unbleached kraft (sulfate) board. Unbleached kraft board is manufactured solely from virgin fibers. Both products have eroded recycled paperboard's market share. Although there may be opportunities to increase demand for recycled board in the future, the effect on ONP consumption would be marginal since much of the wastepaper used in recycled board is old corrugated containers. Most other end-use applications have declined in ONP utilization.

It must be noted that of the 16.9 million tons of newsprint produced in the U.S. and Canada, 90% (15.2 million tons) was composed of virgin fiber. The remaining 1.7 million tons (10%) was composed of ONP with some additions of old magazines.

The information and table in this column are excerpts from the Final Report of the New York State Newspaper Recycling Task Force, prepared by the N.Y. Newspaper Publishers Assn., N.Y. State Dept. of Economic Development, and N.Y. State Dept. of Environmental Conservation.

—Andy Harrison

Demand for U.S. ONP by end-use application and export, 1979-88.

End use	Short tons (000) 1979	1982	1985	1988	% Increase
Newsprint	679	1,066	1,312	1,420	109
Packaging	9	8	5	7	−22
Tissue/towel	124	136	182	214	73
Recycled paperboard	1,344	1,257	1,164	1,307	−3
Construction paper and board	324	206	212	279	−13
Other	350	300	350	500	43
Exports (minus imports)	332	442	640	1,039	213
Total	**3,162**	**3,415**	**3,865**	**4,765**	**51**

Source: American Paper Institute.

MANAGEMENT

Containerboard Markets May Become More Competitive During the 1990s

Demand is forecast to remain healthy, particularly for specialty and graphic grades, but supply is expected to more than keep pace

P&P STAFF REPORT

The containerboard and corrugated box market has closely tracked the economy and is one of the largest segments of the U.S. paper industry. But this segment of the industry will face major challenges through the next decade. New technology at box plants (such as continuous corrugators) and at mills (such as multi-ply forming and high-pressure presses) is fast changing the industry. A major challenge for both box and board producers will be how to generate a respectable profit in markets that are increasingly competitive, based more and more on specialty boxes printed with two or more colors than commodity-oriented regular slotted containers (RSC) brown boxes.

Recently, *Pulp & Paper's Forecaster* published a two-part report on corrugated box and containerboard markets through the year 2000. These reports analyze the long-term trends for both corrugated box and containerboard and the impact of growing demands for specialty linerboards, such as preprinted liners, mottled, and white-top.

To examine major findings from these studies, *P&P* recently interviewed Coleman Rowland of Lakeway Research, author of "Growing Linerboard Specialties," and Ken Lowe of Forecaster Services, who authored "Containerboard and Corrugated Box: Market Outlook to the 21st Century."

P&P: *Is the current slowdown in corrugated box demand a long-term trend indicating a maturing market?*

Lowe: No. Corrugated box demand as measured by square footage normally tracks real growth in GNP and industrial production, and this trend is forecast to continue into the next decade. Over the last ten years, corrugated box demand on a square footage basis grew at a 2.8% annual rate, compared with a 2.8% annual rate for real GNP and 3.3% for industrial production.

True, box shipments slowed in 1989, growing by only 1.2%, and we expect growth to remain lower than normal through 1990. However, as the U.S. economy picks up strength in late 1990 and into 1991, box demand will again begin to closely track real economic growth. For the decade of the 1990s, box shipments are forecast to grow by 2.6% annually. When translated into billion ft^2 of box shipments, the growth over the next decade will be slightly larger than in the 1980s.

P&P: *But haven't changing end use markets had a major impact on box demand?*

Lowe: Yes, many of the leading outlets for corrugated boxes in the early 1980s and 1970s are now slow-growth or declining markets, such as glass containers, canned foods, beverages, and most durable good end uses. The durable goods market has been hurt by high levels of imports and slow growth in U.S. exports.

To some extent, competitive forms of packaging have also cut down on the amount of corrugated containers used in certain end uses, such as shrink wrapping, plastic cushioning material, compression bundling, as well as wrapping. The best growth areas of the last decade were in the fresh fruit and vegetable and dairy products food sectors, in the paper industry in cut-size and converted business papers, and in high-tech electronic areas. These trends are expected to continue into the future, along with a minor rebound in shipments of durable goods.

There are also growing markets in Mexico as a result of the establishment of Mexican assembly plants just across the U.S. border. These plants allow U.S. box makers to ship in boxes or combined boards. Canadian markets will also become more accessible as the free-trade agreement is fully implemented.

P&P: *You refer in your report to the "visual appeal grades" of linerboard. What specific grades do you include in this category?*

Rowland: Five grades of board are included. Mottled white liner, which dominates the category in terms of size at over 1 million tons, is expected to grow at a rate half again as fast as the commodity grades of linerboard. The next largest grades, full-bleached liner and SBS [solid bleached sulfate] boxboard, are each expected to lose ground, while the fastest growing categories are expected to be coated kraft boxboard and white-top linerboard. Overall, we expect the growth of these five grades of white linerboard to grow at more than double the rate of the linerboard industry as a whole.

P&P: *What factors are driving the growth of visual appeal linerboard grades at rates faster than those of commodity linerboard?*

Rowland: Several factors are at work. Self-service merchandising is not a new trend but one that is still being felt in the packaging industry. New consumer products, such as wine coolers, create periodic surges in demand for the white grades of linerboard. The standards for packaging graphics have been inching upward for decades, and that trend still keeps pressure on converters to upgrade printing materials and substrates. The motor oil 12 one-quart shipper at one time epitomized the commodity end of the box business. Now if you visit the automotive department of a K-Mart store, you will find that the minimum graphics for motor oil shippers are two colors on mottled white, with several companies using preprinted liner.

High-end graphics are more available now. In the early 1980s, only a handful of companies offered process flexographic printing or preprinted liner. Now there is overcapacity in the North American preprint industry with 20 presses having a combined capacity of some 10 billion ft² annually.

P&P: *What's the future of preprinting liner?*

Rowland: Good, but the market has grown slower than first forecast, when this method was introduced to the U.S. in the early 1980s. Today, 18 producers make preprint linerboard using 20 multi-station presses installed in the U.S. and Canada. Capacity, however, is far in excess of demand. The total tonnage of graphic board used in 1989 was estimated between 63,000 and 100,000 tons. Many believe that the key to opening new markets for preprint linerboard will be the availability of less expensive substrates than those currently within reach. The greater accessibility of coated unbleached kraft board and white-top linerboard in the early 1990s could provide the impetus for much greater use of preprinting.

P&P: *Isn't white-top linerboard a new grade for U.S. producers?*

Rowland: Yes. In the past, most U.S. box needs were supplied by Canadian mills. Now, two U.S. companies produce this grade, and more are planning to offer it. White top offers essentially the same advantages as bleached liner, as far as whiteness and printability are concerned, but it is also stronger and substantially lower in cost. White-top liner is expected to offer competition not only to bleached liner but also to mottled white since it makes available an easy way to upgrade from mottled. U.S. white-top liner production is forecast to increase from about 10,000 tpy in 1988 to 200,000 tpy by 1992.

P&P: *Just what is "high-performance containerboard?"*

Rowland: Thus far, no industry standards exist, but high-performance containerboard (HPC) is defined in our report as those grades designed to produce for a given basis weight higher levels of stacking strength than would be expected from standard containerboard grades. We defined HPC in our report as grades offering a test result of at least 2 lb of ring crush/lb of basis weight. For example, 42 lb/1,000 ft² linerboard would be needed to produce at least 84 lb of ring crush in order to qualify as HPC by this definition.

The term HPC is used in the industry to describe a wide variety of products. Some suppliers are offering average ring crush specifications, while others specify a minimum ring crush. Some suppliers allow the basis weight to float, while others guarantee both ring crush and basis weight. A few second-generation grades of HPC are now addressing not only ring crush but also the printability of the board and its consistency across the sheet in terms of caliper, basis weight, and moisture. These grades are aimed at the high-speed corrugators and high-end printing operations.

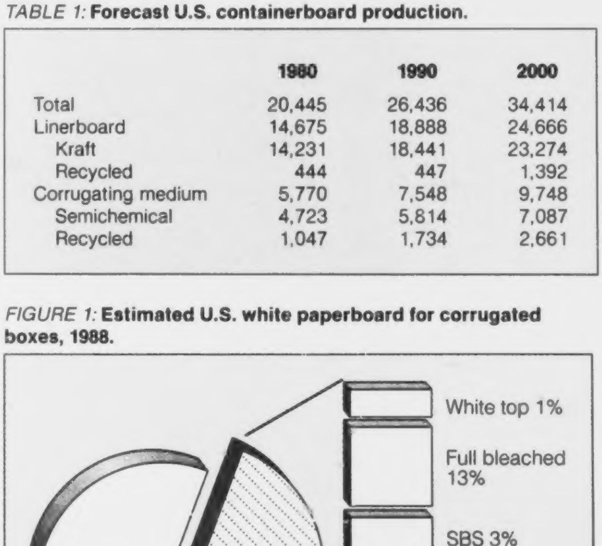
P&P: *Why are linerboard producers interested in making HPC?*

Rowland: Many linerboard producers have found that high-load presses can be easily justified by enhancing production rates and maintaining strength specifications when using lower-cost raw materials. A few companies choose to upgrade the strength, surface, and consistency of their linerboard and charge a premium price for the improved sheet. As one HPC producer put it, his company sells all of the HPC that the market will absorb and then takes the benefit of its high-load presses in terms of lower cost for the balance of its capacity.

TABLE 1: **Forecast U.S. containerboard production.**

	1980	**1990**	**2000**
Total	20,445	26,436	34,414
Linerboard	14,675	18,888	24,666
Kraft	14,231	18,441	23,274
Recycled	444	447	1,392
Corrugating medium	5,770	7,548	9,748
Semichemical	4,723	5,814	7,087
Recycled	1,047	1,734	2,661

FIGURE 1: **Estimated U.S. white paperboard for corrugated boxes, 1988.**



P&P: *Is a high-load press required to make HPC?*

Rowland: No, it is probably the easiest way but certainly not the only way. Some companies upgrade their raw materials, and others change their existing machine parameters, such as rush-drag ratio. Producers of HPC tend to have their own proprietary recipes for achieving improved ring crush results.

P&P: *Is HPC of interest only to box users who need additional stacking strength?*

Rowland: If a box user is having trouble with loads collapsing in the warehouse, HPC is certainly an alternative that could be looked at before the user upgrades the basis weight of the containerboard, adds inner packaging, or invests in rack systems. It didn't take the more aggressive box salesman long to find that HPC might be of interest to customers who had no stacking problem at all. By converting to HPC liners, a box user whose shipments are unregulated can downgrade the basis weight of the box liners to a degree that more than offsets the higher price/ton of the HPC linerboard, thereby significantly reducing the material cost of the box.

These cost savings may be split between the box plant and the box user or just passed on to the user. In either case, the box user has a lighter, cheaper box that performs as well as the old box. Assuming the box plant upgrades its margin by using the new specifications, as it might be expected to do, everyone (mill, box maker, and box user) benefits from the switch to HPC.

P&P: *Isn't the rapid development in world trade going to require more kraft linerboard exports from producing countries, such as the U.S.?*

Lowe: Yes, but the level of increase will be smaller than one would expect. U.S. producers will continue to be the dominant supplier of kraft linerboard to world markets since few other countries have the softwood resources and the low cost position of U.S. mills, particularly in the South. But outside of the U.S., the dominant linerboard is recycled board or a board containing high percentages of recycled fiber, such as Japanese K-liner. Kraft linerboard accounts for 42% of total world containerboard consumption, compared with 65% in North America. By the year 2000, kraft linerboard is forecast to account for about 38% of total world demand. Slower growth for kraft liner and more competition from nontraditional suppliers is going to reduce the U.S. share of exports. But even in spite of more competitive markets, U.S. exports are forecast to increase by close to 550,000 tons from 1990 to the year 2000.

P&P: *What's the chance of more greenfield linerboard and medium mills being built in North America?*

Lowe: Not good. During the 1980s, only one greenfield kraft linerboard mill and one recycled linerboard mill were built. At current containerboard prices, the building of greenfield mills for either linerboard or corrugating medium cannot normally be financially justified, especially when compared with incremental expansions at existing mills. The development of new forming and pressing technology, plus the use of higher levels of corrugated container wastes, have permitted existing kraft mills and corrugating mills to expand at costs about 50% lower than those required to add capacity via greenfield mills. To justify a new greenfield kraft liner mill, linerboard prices would have to average at least $75/ton above those currently forecast over the next decade, a price level that is unlikely to be achieved.

P&P: *But aren't greenfield mills for recycled linerboard justified?*

Lowe: When compared with building greenfield kraft mills, a 600-tpd recycled linerboard mill costs about 50% less to build, but the total manufacturing costs still average only about 10% lower than those of a new world-class kraft liner mill. However, what has to be remembered in evaluating a recycled project is that the recycled project won't be competing with a greenfield kraft mill but with existing kraft mills that have substantially lower fixed cost structures. Further, the profitability of a recycled mill is at the mercy of wastepaper price trends. When OCC [old corrugated containers] sells at prices below about $60/ton f.o.b, the manufacturing costs at a new recycled mill are probably close to those of existing kraft linerboard mills. But at much above this level, recycled mills have higher costs.

P&P: *Based on announced projects, is a rash of new recycled linerboard mills going to be built?*

Lowe: Yes, as much as a 2 million tons of new recycled linerboard and corrugating medium capacity may come online in the next five years, based on announced projects. If all of these projects and more are undertaken, a serious oversupply of containerboard is going to occur into the mid-1990s. Since such an oversupply will depress prices, many of these proposals will never be economically attractive. Obviously, a good chunk of new capacity is going to come from recycled grades, and there are circumstances justifying the building of new recycled linerboard mills. For example, if a company can secure a long-term, low-cost supply of corrugated wastes, the economics are favorable. But we continue to believe the best use of OCC waste is as a supplemental fiber furnish in kraft liner at existing mills. In the U.S., the average unbleached kraft paperboard contains only 10% recycled fiber. Since some grades now contain more than 25% recycled fiber, there is plenty of room to use more recycled fiber in kraft linerboard grades. ■

More information on containerboard

Interested readers can obtain more information on these reports, including a summary of major findings, by writing to *The Forecaster*, Linerboard Reports, 500 Howard Street, San Francisco, Calif. 94105, or by calling Ola Jane Gow, Forecaster Services, Miller Freeman Publications, (415) 995-2450.

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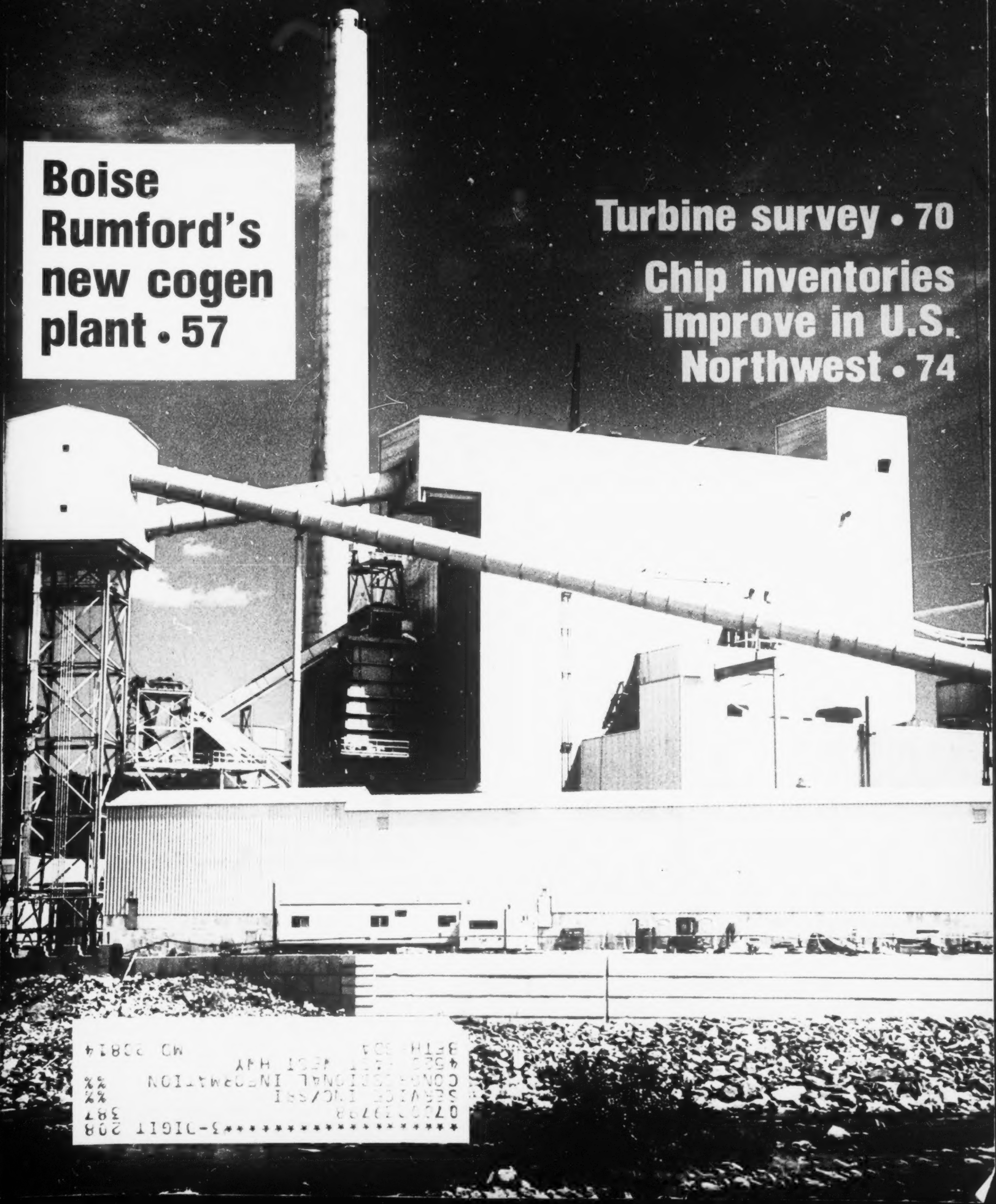
July 1990



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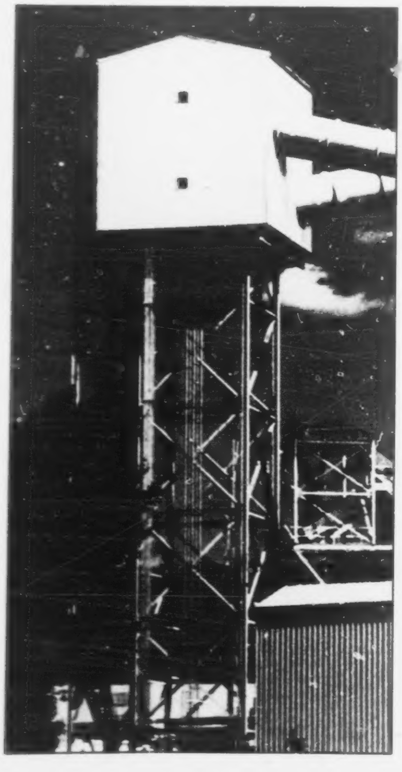

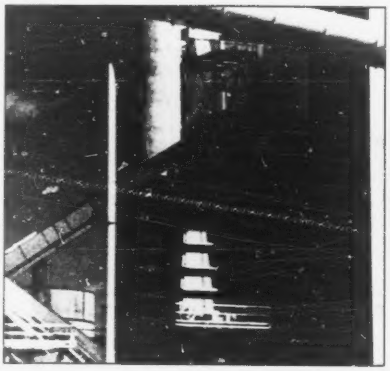

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Rumford Cogeneration Co.'s $187-million power plant started up last month in Rumford, Maine. See story on p. 57. (Photo courtesy of Boise Cascade.)

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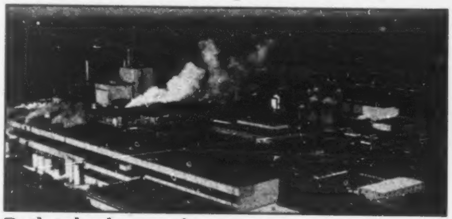

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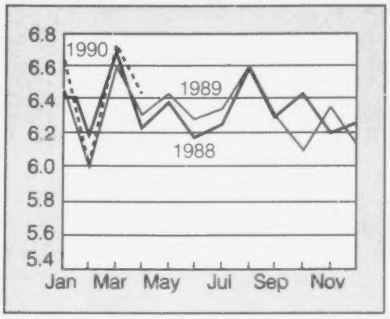
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.7 million tons in March, an increase of 1.3% over the same month last year, according to American Paper Institute data. The seasonally adjusted rate of production in the first quarter was 77.7 million tpy, 1.4% higher than the year-earlier rate. Through March, mills produced paper at a seasonally adjusted rate of 39.2 million tpy, up 2.4%, and paperboard at 38.4 million tpy, up 0.3%.

Among major grades, newsprint was responsible for most of the gains in the paper sector, reflecting the recent startup of new capacity. Uncoated groundwood continued to lead the printing and writing grades, which, overall, were up 2.8% in the first quarter. A 7.8% increase in production of containerboard for export was barely enough to offset a 0.1% decline in production for the domestic market, leading to an overall gain of 0.5% through March. The situation is similar for boxboard, with export production up 11.7% but output for domestic use up just 0.8%.

Canadian newsprint shipments totaled 825,000 metric tons in March, up 2.7% from last year, but pulp shipments dropped 11.5%, to 690,000 tons. Operating rates were 95% at newsprint mills and 88% at market pulp mills. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Apr.	541	9.3	6,440	9.3
Uncoated groundwood (s)	Apr.	155	4.0	1,809	4.2
Coated paper (s)	Apr.	567	4.2	7,209	2.7
Uncoated free-sheet (s)	Apr.	971	7.3	11,638	2.9
Other printing/writing	Apr.	128	3.2	1,625	6.0
Total packaging and other paper (s)	Apr.	394	5.1	4,824	-2.6
Tissue	Apr.	467	3.5	5,676	1.9
Total paper	**Apr.**	**3,222**	**5.9**	**39,222**	**3.0**
Unbleached kraft paperboard	Apr.	1,627	2.4	19,694	2.2
Semichemical medium	Apr.	466	-0.4	5,613	-2.0
Bleached paperboard	Apr.	378	6.2	4,517	2.7
Recycled paperboard	Apr.	731	-0.9	8,770	-1.3
Total paperboard	**Apr.**	**3,202**	**1.7**	**38,595**	**0.8**
Total U.S. paper and paperboard output	**Apr.**	**6,425**	**3.8**	**77,817**	**1.9**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Mar.	5,261	-0.9	62,914	1.1
Market pulp production	Mar.	725	-6.0	8,675	-3.0
Wastepaper consumption at paper/board mills	Mar.	1,804	11.7	20,757	5.5
Pulpwood consumption (cords)	Mar.	8,341	2.1	100,008	2.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Apr.	26.619	0.6	105.087[6]	0.8
Containerboard inventories at U.S. box plants and mills	Apr. 1	2,626	2.2		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Mar.	1,152	2.1	13,190	3.1
Imports of Canadian newsprint	Mar.	722	2.1	8,421[6]	3.4
U.S. paper exports (including products)	Mar.	597	-1.5	6,711	6.9
Exports of unbleached kraft linerboard	Mar.	234	1.3	2,557	9.0
Exports of woodpulp	Mar.	578	-7.2	5,632	-11.3
Norscan pulp inventories[4]	Apr. 30	1,388	72.6		
Norscan pulp operating rates[4]	Apr.	85%	85%	94%	90%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Apr.	814	5.0	3,073[6]	0.6
Operating rates	Apr.	93%	95%	94%	97%
Inventories held by U.S. consumers	Apr. 30	1,287	-2.7		
Other paper/board shipments	Apr.	605	8.0	2,424	7.4
Woodpulp shipments (export only)	Apr.	620	-6.6	2,541	-8.7
Operating rates	Apr.	80%	91%	88%	96%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Bleached paperboard: Market tightness eases but prices of SBS packaging remain firm

Grade structure: Solid bleached sulfate (SBS) is used primarily for folding carton and milk carton packaging and is produced from a furnish containing at least 80% virgin-bleached woodpulp. Other uses include cup and plate stock, food containers, miscellaneous packaging, and linerboard. Calipers range from 10 to 28 pt, in low, medium, and high density, and basis weights vary from 40 to 100 lb/1,000 ft². Most SBS is either clay coated or polyethylene coated.

Markets: Market demand for bleached paperboard grades, as measured by their 1990 capacity share, is folding boxboard, 49.2%; milk carton and food service, 41.8%; linerboard, 4.0%; and other packaging, 5.0%.

Production/capacity: Total production in 1989 increased only 10,000 tons to 4.521 million tons, which was close to the industry's effective maximum output. Exports increased by 55,000 tons to 683,000 tons, representing about 15% of production.

In 1989, producers were capacity constrained and unable to meet customer demand for all grades of SBS packaging. Some long-term relief is in sight by 1992, when Westvaco Corp. plans to start up a new 350,000-tpy SBS machine earmarked for the production of packaging grades. This will be the first new SBS machine installation since 1986.

In the short term, International Paper Co., Potlatch Corp., Georgia-Pacific Corp., and Federal Paper Board Co. will upgrade existing machines to add about 115,000 annual tons of capacity by the end of 1990, but downtime scheduled for these rebuilds will reduce available production capacity this year. Total U.S. capacity for bleached kraft paperboard is estimated to reach 5.2 million tons in 1992, according to the American Paper Institute figures.

Outlook: Demand for bleached folding carton stock weakened early this year as folding carton converting plants began to reduce their inventories in response to falling U.S. retail sales. Inventories of both materials and finished goods had jumped to 13.1 weeks of supply in the second half of 1989. Folding carton demand is expected to return to normal levels after customers have reduced their excess inventories.

Demand for paperboard liquid packaging will continue last year's strong growth trend in domestic and export markets. U.S. producers are worldwide suppliers of liquid packaging; Scandinavian producers are as well.

The demand for disposable bleached paperboard food service products should remain firm this year. Environmental concerns about plastic disposable packaging have benefitted traditional paper disposable products, such as cups, plates, trays, and food containers.

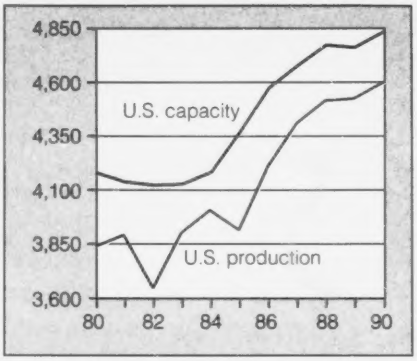
Demand and supply will remain in equilibrium this year, and industry operating rates will remain high because of major production curtailments at International Paper Co. and Federal Paper Board Co. related to machine rebuilds.

I-P was scheduled to complete the rebuild of the liquid board machine at Pine Bluff, Ark., in mid-June following a month-long shutdown. In early July, Federal is scheduled to shut down its multi-ply SBS machine at Augusta, Ga., for an extended five-month rebuild.

Prices: Producers raised prices of clay-oriented folding boxboard grades by $50/ton on Jan. 1,1989, and again last Aug. 1, raising the price of 15-pt board to between $830 and $840/ton. Prices of polyethylene-coated milk carton stock and other specialty packaging grades increased at the beginning of the year to the $1,100/ton level. Prices of coated printing bristols that are produced by several large SBS producers also increased last August to between $1,050 and $1,150/ton.

Historical prices for fully bleached, clay-coated 15-pt folding carton boxboard (rolls, $/short ton, year-end prices): 1980, $550; 1981, $625, 1982, $590/625; 1983, $590/625; 1984, $590/665; 1985, $500/590; 1986, $580/590; 1987, $635; 1988, $730; 1989, $830. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	**1988**	**1989**	**1990e**
Production	4,511	4,521	4,594
Capacity[1]	4,733	4,723	4,838
Utilization rate	95.3%	95.7%	95.0%
Imports	10	20	40
Exports	628	683	751
Apparent U.S. consumption	3,893	3,858	3,883
lb/capita	31.7	31.1	31.6
GNP ratio	.97	.93	.92

e = *Pulp & Paper* 1990 estimate.

1. American Paper Institute capacity data.

2. 1,000 tons/$ billion real GNP.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity (000 short tpy)	**Market share (%)**
1. International Paper Co.[1]	935	19.7
2. Federal Paper Board[2]	631	13.3
3. Westvaco Corp.	620	13.1
4. Potlatch Corp.	554	11.7
5. Georgia-Pacific Corp.	360	7.6
6. Temple-Inland Inc.	357	7.5
7. Champion Corp.	247	5.2
8. James River Corp.	235	4.9
9. Gulf States Paper Corp.	230	4.8
10. Weyerhauser Co.	220	4.6
11. Gilman Paper Co.	200	4.2
12. Jeff. Smurfit/CCA Corp.	185	3.9
13. Union Camp Corp.[3]	140	N.A.

Market share of top five companies:
65.4%
Market share of top ten companies:
92.4%
Total U.S. capacity (1990):
4.838 million short tons
Estimated available 1990 capacity
4.728 million short tons

1. Will lose 50,000 tons in 1990 from downtime.

2. Will lose 60,000 tons in 1990 from downtime.

3. Includes more than 50% swing capacity.

N.A. not available.

Talks begin between Stone-Consolidated and CPU

Contract talks began May 31 between Stone Container Corp. negotiators and seven locals of the Canadian Paperworkers Union at three Stone-Consolidated newsprint and groundwood paper mills along the St. Maurice River in Quebec. In addition to seeking an 8% wage increase in both years of a two-year pact, CPU said it is pursuing job security and safety issues that were given high priority at its wage conference.

Union negotiators for mills in Shawinigan, Grand'Mère, and Trois Rivières, Que., representing 2,250 workers, will be seeking to establish an agreement with Stone that will serve as a pattern for nearly 30,000 paperworkers in eastern Canada. The union's negotiating team is headed by CPU Quebec vice president Edmond Gallant, while officials of Stone Consolidated head the company's effort. In total, the negotiations affect mills accounting for 80% of Canada's newsprint production, 40% of market pulp, and 75% of other paper and board. The union has presented all companies in its eastern jurisdiction with its agenda but will negotiate only the major items with Stone-Consolidated until an agreement is worked out, a union spokesman said. Local issues may vary slightly from the Stone agreement. There are 45 items in the CPU agenda to be addressed at the negotiating table.

Citing lost jobs due to automation, plant closures, and machine shutdowns, CPU at its convention gave top priority to job security, which it hopes to provide by an attrition principle which would mean there would be no reduction of jobs except by natural causes such as retirement or death. CPU said it will be pressing for "better language" on contracting-out and early retirement.

Another nonwage issue receiving focus from CPU is safety, and the union said its agenda contains a comprehensive program to protect its members in the use of chemicals, gases, and industrial diseases. Also in play in this year's Canadian contract talks is the Goods and Service Tax that comes into effect in 1991. The GST will tax items not presently taxed by the federal government and is predicted to add at least 1.25% to the overall inflation rate. The union officially opposed the GST but has said that it expects a wage agreement to reflect the impact the GST will have on its members.

Following the CPU wage conference, the union increased its strike relief program and also requested voluntary contributions to provide a supplement to the remittance. ■

Canadian paperworkers union contracts.

	Term	Wage Increase	CPI Increase	Strikes	Major issues
1978	1st year	6.9%	8.9%		Inflation, wage and price controls, reinstate COLA[1]
	2nd year	5.8			
1980	1st year	9.0	10.2	Abitibi/ 6 weeks	
	2nd year	9.5			
1981	1st year	15.0	11.4	B.C. mills/ 6 weeks	
	2nd year	13.0			
	3rd year	0.0			
1982	1st year	12.0	10.8		
	2nd year	10.0			
1984	1st year	2.5	4.4	B.C. mills/ 12 weeks	Regain wages lost during price controls, and improve pension plans
	2nd year	4.5			
	3rd year	5.0			
1987	1st year	1.8	4.4	Briefly at Consolidated-Bathurst and Great Lakes	
	2nd year	3.1			
	3rd year	4.5			
1990	CPU wants two-year pact	8.0% each year plus COLA equal to 1¢ for each 0.1 rise in CPI.	5.5-6.0% (forecast)		Job security, health and safety, and parity with the Goods and Service Tax

1. Cost of living adjustment. Source: Canadian Paperworkers Union.

KRAFT PAPER

Prices hold firm despite lower production

U.S. kraft paper producers are largely succeeding at keeping market prices firm despite lower production during the first half of the year. Prices for both bleached and unbleached grocery bag and sack paper, multiwall sack paper, and lightweight bag paper are close to the same levels as last year in the eastern U.S. Generally, 70-lb grocery sack paper prices average about $495/ton, 50-lb multiwall sack prices average about $550/ton, 30-lb lightweight bag paper prices average about $660/ton, and 30-lb bleached lightweight bag paper prices average about $800/ton. Some West Coast prices for 70-lb grocery sack paper and 30-lb lightweight kraft paper are lower than prices for comparable grades in the East.

In the U.S., production of unbleached kraft paper declined about 10%, or 94,000 tons, in the first four months of this year, according to statistics from the American Paper Institute. During the same period, Canadian shipments of kraft paper to the U.S. increased 18%, or 10,000 tons, according to the Canadian Pulp & Paper Assn. There were also some imports from Mexico during the first half of the year, but the data is not yet available. Nonetheless, the evidence is clear that total shipments of the commodity kraft paper grades had weakened, reflecting both lower demand and production curtailments.

The production curtailments resulted from some mills scheduling maintenance downtime during the past several months. International Paper Co.'s Camden, Ark., mill curtailed production for one week in April for annual maintenance, and Stone Container Corp.'s Hodge, La., mill took about one week of downtime on each of its four paper machines in May.

Stone to swing Hodge machine. Stone has shifted production on the Hodge mill's large No. 5 machine from exclusively kraft paper to partly lightweight linerboard. A spokesman said the company now plans to produce between 5,000 and 10,000 tons/month of linerboard on the machine, which becomes the industry's eighteenth swing machine producing both grades. Total swing machine production of linerboard edged up about 4% through April. ■

Balance shifts in hydrogen peroxide market

The North American hydrogen peroxide market has shown signs of easing in recent months, a welcome relief for producers and consumers alike. The change in market conditions is primarily due to the output of FMC Corp.'s Prince George, B.C., facility (70 million lb/year nameplate capacity) beginning in early May. "Although the product is still tight right now," commented Peter Lai, vice president-marketing at Interox America, the FMC startup will "ease the pain some and allow a slower [production] pace for others. This means manufacturers can have more shutdowns, schedule maintenance, and perhaps do some inventory building."

The easing of the market is also due, in part, to early success at Interox's Longview, Wash. plant, which reportedly is running better than expected and maintaining higher effective capacity (about 40 million lb/year) since startup in late 1989. Furthermore, that plant is slated for a 65-million-lb expansion (in nameplate capacity) to be completed by first-quarter 1991.

As for the coming months, producers differ on how market conditions will shake out. Most agree, however, that the market will continue to grow at a stellar pace and that new capacity (at least in the near term) will be utilized as soon as it becomes available.

The hydrogen peroxide market, fueled primarily by environmental issues and concerns, is continuing to expand rapidly in three areas: bleached mechanical pulp, chemical pulp, and paper recycling.

OPINIONS DIFFER. Ron Scheff, product manager-hydrogen peroxide for Du Pont, asserts that the FMC startup will create some overcapacity in the near term and that other anticipated startup or expansion projects should slightly outpace demand until sometime in 1993. Scheff bases his assertion on anticipated growth of about 12% to 15% through 1993 in addition to the anticipated output of announced new capacity. He feels that capacity could outpace demand, particularly during the latter part of 1991 when both Degussa (Mobile, Ala.) and Du Pont (Gibbons, Alta.) are expected to add 80 million lb each to the available supply (Table 1).

Oxychem Canada president Alain Chauvet agrees with Scheff, but their reasons differ. He adds, "By the end of 1991 or early 1992, there could be some capacity available, although only about 150 million lb, which is not that much." Chauvet forecasts light growth in the paper industry of only 8% in 1990 , 8% to 10% in 1991, and 15% in 1992. He believes growth will be primarily dictated by bleached chemi-thermomechanical pulp (BCTMP) mill startups (Table 2), some of which have been delayed or postponed.

Lai, in contrast, sees much broader growth ahead. He said, "The hydrogen peroxide market should remain balanced for the next five years, [and] all new expansions are expected to be in step with growing demand." He predicts that the paper industry will

(Continued p. 45)

Company	Location	Capacity	Date
Oxychem Canada	Becancour, Que.	22	3Q 1990
Oxychem Canada	Becancour, Que.	22	1Q 1991
Interox America	Longview, Wash.	65	1Q 1991
FMC	Prince George, B.C.	20	2Q 1991
Degussa	Mobile, Ala.	80	3Q 1991
Du Pont	Gibbons, Alta.	80	4Q 1991

TABLE 1: **Announced hydrogen peroxide capacity startups/expansions. (All capacities are nameplate, in million lb.)**

Company	Location	Startup date
Donohue Matane Inc.	Matane, Que.	1990
Slave Lake Pulp Corp. (Alberta Energy)	Slave Lake, Alta.	1991
Temcell	Temiscaming, Que.	1991
Louisiana-Pacific Corp.	Chetwynd, B.C.	1991
Millar Western Pulp Ltd.	Meadow Lake, Sask.	1992
Shinho Paper Manufacturing Co. Ltd.	Thunder Bay, Ont.	1992
Cascades Inc.	Cabano, Que.	1992
Scott Paper Ltd.	Crabtree, Que.	1992
Fibreco Pulp Inc.	Taylor, B.C.	1993

TABLE 2: **Announced BCTMP startups.**

use 300 million lb in 1990 (an increase of about 35% to 40% over the 205 to 220 million lb used in 1989) and another 35% to 50% increase (over 1990) to about 400 to 450 million lb by 1995. Lai emphasized continuing "environmental pressure in both chemical bleaching and recycling. While there is some degree of uncertainty as to where legislation will end up, both in terms of allowable effluent contaminant levels and required recycled fiber content, these areas will continue to provide opportunities," he said.

Mark Koznarek, manager-pulp and paper for FMC, agrees. "The hydrogen peroxide market probably won't ease up for some time. The new plants [coming online] in 1991 still won't affect market conditions because the market is growing in step with demand," he said. According to Koznarek, growing demand in environmental applications and recycling, coupled with timely new capacity, "will ensure orderly growth" of the market. He forecasts 20% growth in both 1990 and 1991.

Total North American demand for hydrogen peroxide in 1989, excluding internal plant use and export markets, was 510 million lb. Of this, paper industry use accounted for 205 to 220 million lb, about 40% of the market. Nameplate capacity in 1989, depending on producer, ranged from 620 to 665 million lb, while the industry's output (or effective capacity) was estimated to be between 520 and 550 million lb. However, the year-end addition of 40 million effective lb at Longview boosted annualized effective capacity as of Jan. 1, 1990, to 580 to 600 million lb. Counting Prince George capacity and the 22-million-lb expansion at Oxychem Canada's Becancour, Que., plant, capacity now stands at 660 to 735 million lb. All producers agreed that inventory adjustments for the year were close to zero. North American demand is expected to reach about 610 million lb in 1990, while paper industry demand should reach 220 to 300 million lb.

A look at upcoming activity suggests a busy schedule for producers in the next few years, especially 1991 (Table 1). In that year alone, 290 million lb of new or expansion capacity will hit the market, running the North American nameplate capacity to between 900 million and 1.025 billion lb, a 40% increase over the current nameplate capacity.

MARKET FORCES. Producers agreed with Scheff's assertions that dioxin is just the beginning of environmental concerns and that as testing technology develops, all chlorinated organic compounds will be studied and controlled, possibly forcing chlorine use out of chemical pulp bleaching altogether and even bringing chlorine dioxide under the same scrutiny as chlorine.

Lai added, "Part of the uncertainty in the paper industry markets is that there is always the possibility of alternative technology, especially with the replacement of chlorine, because the best [available] technology is not etched in stone yet." Another caveat is the uncertainty in the caustic market (especially availability) in the wake of plummeting chlorine use, since hydrogen peroxide use is usually associated with caustic.

Producers also pointed out that the mechanical pulp sector is being closely watched because of existing overcapacity, downward pressure on some mechanical grade prices, and the recycling movement. These pressures could ultimately force reduced production of bleached mechanical fiber, although the recycled market itself would provide some outlet for peroxide use.

OTHER PROMISING MARKETS. Although recycling is currently a modest market (10 to 20 million lb), most producers feel that this market will double in size in the coming years, primarily due to increased awareness and government legislation dictating the increased use of recycled fiber.

Hydrogen peroxide use is also experiencing some growth in effluent treatment, where it is typically used as a source of supplemental oxygen and also provides a convenient way to oxidize sulfides. Although this segment tends to be seasonal, with greatest use coming in spring and summer when biological activity increases, estimates put the size of this market at about 90 million lb annually. All producers think this area will grow, yet one producer said his company's approach to effluent problems calls for utilizing peroxide in the bleach plant, thereby producing cleaner effluent from the start. Some also consider peroxide, which costs $0.45 to $0.46/lb for 70% concentration, too expensive for such applications.

—Tim Downs

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ISSUE FOCUS: PULPWOOD PROCESSING

Northwest Woodfiber Survey Contrasts Abundance, Scarcity

Inventory balance from a mix of pulpwood and sawmill/veneer plant residue is facing heavy preservationist pressure

By CHARLES S. LEWIS

The woodchip inventory in the five states of the Pacific Northwest and Inland Empire that was in balance with paper industry demand in fall 1988 went completely out of control by the end of 1989.

Pulpwood followed a similar trend. Along the Columbia River fiber shed alone, the forest products mills adjacent to this drainage saw pulpwood log inventory leap tenfold from 20-plus-million bd ft to 200-plus-million bd ft within 1989's spring-fall period (Figure 1).

There are several reasons for this explosive buildup of fiber inventory. The year 1989 presented a strong demand for all forest products. The pulp and paper market was outstanding. The logging season extended from early spring through early winter, without the usual fire interruptions and restrictions. Yet 1989 also saw long economic shadows fall over the western forest products industry. Now the timber harvest in the West is on a downtrend.

Currently, the commercial forestland base for the western U.S. is approximately 130 million acres. Most of this acreage is in the Pacific Northwest (Washington, Oregon, California) and the Inland Empire (Idaho, Montana). Two-thirds of this land is in public ownership, and the other one-third is privately owned. British Columbia has a commercial forestland base of approximately 117 million acres, 95% owned by the provincial government. All three regions participate in the Pacific Rim marketplace (Table 1).

The average timber harvest from the three regions produces approximately 35 billion bd ft (Scribner log scaling rule) annually. The Pacific Northwest contributes 50% of this total volume, 40% comes from British Columbia, and the remaining 10% is supplied by the Inland Empire.

This timber volume is the raw material base that sustains the forest products industry's manufactured products of pulpwood, lumber, veneer, shingles, poles, piling, and residues. The resultant pulpwood products and wood residues are 75% wood and 25% bark. This volume comes to 30 million bone-dry (b.d.) tons of wood (b.d. tons = 2,000 lb) and 10 million b.d. tons of bark, totaling 40 million b.d. tons.

Mr. Lewis is president, Wood Fibre Northwest, Albany, Ore. 97321.

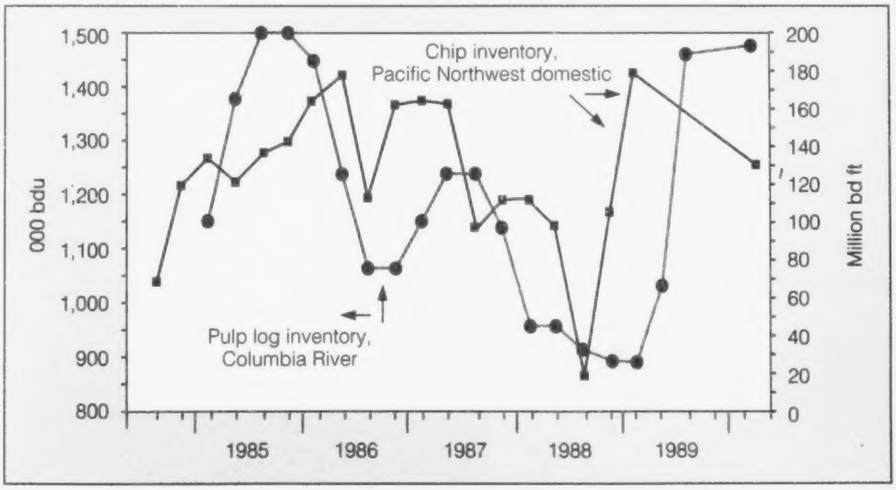

FIGURE 1. **Pulp log and chip inventories, 1984-89.**

I can state unequivocally that British Columbia is approaching a supply/demand equilibrium, but I can't predict exactly when that will occur. The chip and pulpwood inventory dilemma evident in the Pacific Northwest and the Inland Empire leaves British Columbia relatively unscathed.

Relative to the current U.S. chip and pulpwood inventories, prices for Douglas fir in the $100/bone-dry unit (bdu) range (bdu = 2,400 lb of dry weight) are down from last year by $10 to $30/bdu delivered domestically. Prices in the $133/bdu range are down $10 to $16/bdu f.o.b. vessel export. These prices are effective during first-half 1990. Figure 2 charts export chip inventories and prices since 1985. Only when these high-volume inventories have been reduced sufficiently by price reduction and allocation will a normal price/flow pattern be attainable.

This reduction may mesh with the shortage of raw material availability resulting from public timber reductions. Preservationists have succeeded in establishing the northern spotted owl as a threatened species, thus freezing, at least temporarily, the 1990 U.S. Forest Service timber sales program in Oregon and Washington. This action comes on the release of a report by a trans-departmental government committee recommending that up to 8.5 million acres be set aside for the owl's protection if it is declared endangered. (The U.S. Fish & Wildlife Service categorizes a graduated distinction between a threatened and an endangered species.)

This action, in turn, means the removal of from 700 million to 1.7 billion bd ft from the U.S. Forest Service timber sale program in 1991. The precise deletion is to be made later this year. The Dept. of Interior's Bureau of Land Management will be required to make a similar adjustment in its 1991 sales program. Regionally, the state of California has several proposals for ballot initiatives that, if passed, would reduce the public and private timber harvest by 10% to 50%. If and when these events occur, we will see a unique case study for price stability in the woodfiber market.

Despite the recent surplus in pulpwood fiber, a shortfall of raw material resulting from court appeals by various environmental groups has contributed to 46 sawmill and panel board plant closures in the past two years. Over the past decade, 109 sawmills and 56 panel plants have been permanently closed. So far, production has been maintained and the current market supplied with manufactured products by surviving mills using multiple shifts and wood transported from distant points at high cost. High timber values have presented the opportunity for local small timber owners to maximize their return for their standing timber. On the other hand, the supply of high-grade lumber that comes from old growth timber, particularly Douglas fir, will soon become scarce because of these legislative and bureaucratic edicts.

To meet these multifaceted challenges, the forest products industry must upgrade its processes to handle smaller-dia and more diverse species of raw material.

TABLE 1. **Pacific Rim woodchip exports (million bdus).**

	U.S. Pacific Northwest		**Canada British Columbia**
1988	1.97	Softwood	0.74
	0.78	Hardwood	0.36
	2.75		**1.10**
Total		**3.85**	
	U.S.		**Canada British Columbia**
1989			
Pacific Northwest	1.98	Softwood	0.84
Pacific Northwest	0.86	Hardwood	0.59
Southeast	0.37		
	3.21		**1.43**
Total		**4.64**	

bdu (bone-dry unit) = 2,400 lb.

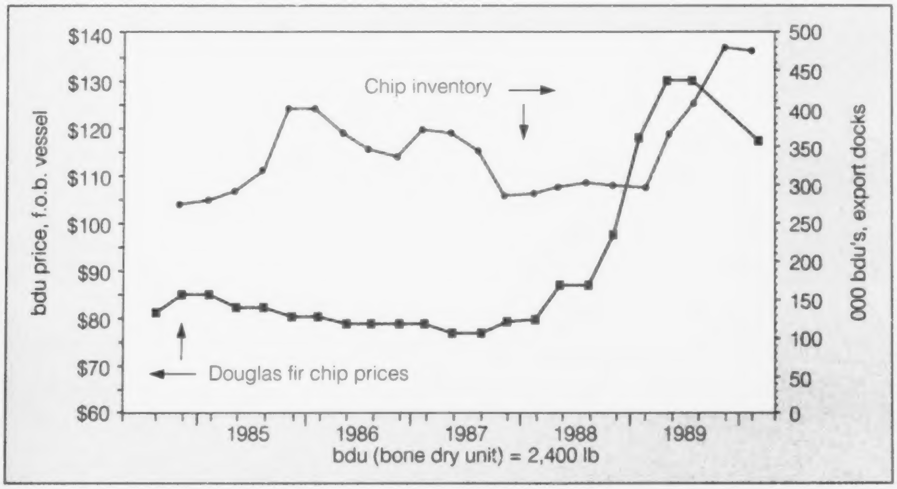

FIGURE 2. **Export chip inventories and prices.**

Longview Fibre Co. in Longview, Wash., is typical of mills in the Pacific Northwest concerned about future chip supply.

Meanwhile, Congress must stand up to preservationist pressures attempting to halt timber harvesting throughout the federal forests. Hanging in the balance is the continued production of forest products for the economy, the maintenance and preservation of employment, the survival of timber-dependent communities, the continuing flow of tax revenues to the federal level and the "in lieu" tax monies to the local county level. These factors are all predicated upon the continued harvesting and replanting of standing timber.

The pulp and paper industry has taken steps to alleviate these production problems. Throughout the West, 55 chip plants are either proposed, being built, or online at this time. For the most part, these chip plants have a direct financial or contractual relationship with a specific pulp and paper corporation. The full complement will be reached when sawmills and veneer plants can no longer supply sufficient residual material for their pulp production.

The forest products industry, whether supplied from public or private lands, has been permanently enjoined with the preservationist movement. At first glance, there is no resolution to this situation, only frustration from all quarters. The optimistic (and capitalistic) viewpoint is that the pulp and paper industry will somehow be supplied and thrive. Species of trees and other plants not now used will enter into the manufacturing picture, with grading standards adjusted to meet these changes. When the chips are down (pardon the pun), the economy will be served, no doubt at a greater cost and with a greater variance in product quality. ■

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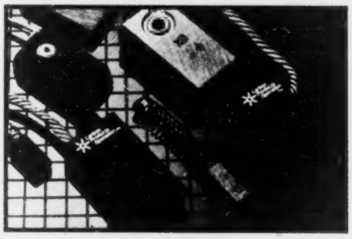

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PULP & PAPER

August 1990

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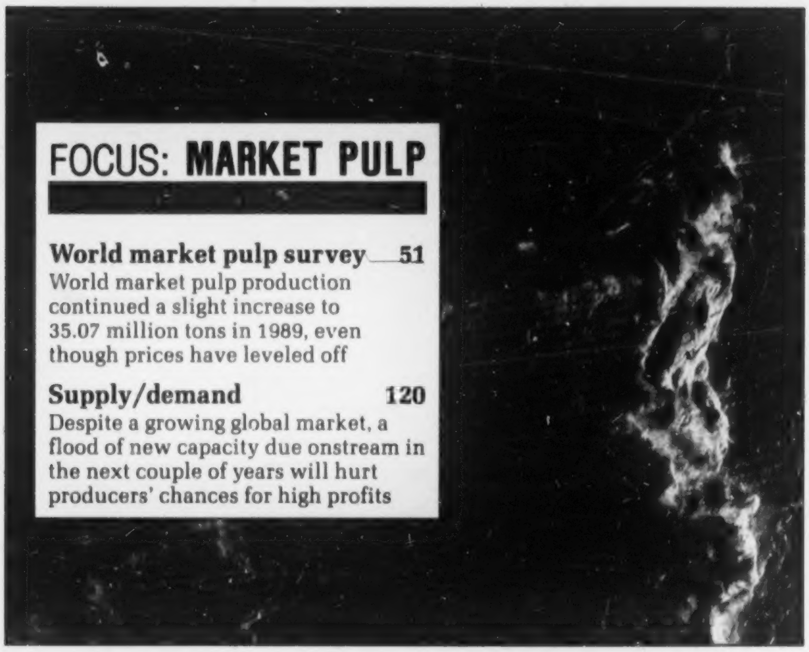

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For this issue's focus on market pulp, we gave our photographer free rein. By projecting colored lights across a sheet of market pulp, he was able to reveal its texture in detail. **(White Gold semibleached news kraft couresty of Pope & Talbot, Halsey, Ore.)**

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PULP & PAPER

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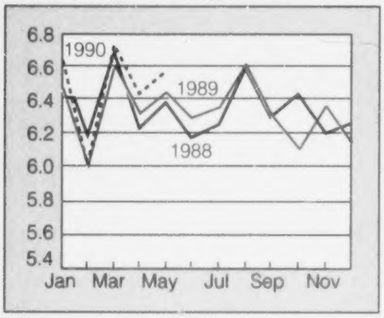
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.6 million tons in May, according to the American Paper Institute, an increase of 2.2% over the same month last year. The seasonally adjusted rate of production climbed to 77.7 million tpy, outpacing last year's record production by 1.4%. The paper sector accounted for most of the increase, with production 2.8% ahead of last year. Paperboard production was up a modest 0.5%.

Among major grades, newsprint led the way with a 9.1% increase, which came despite flat consumption patterns and relatively low publishers' inventories. Shipments of printing and writing paper climbed 2.8% over January-May period on the strength of a 3.5% gain for coated grades. Containerboard production posted a 1.0% increase, largely due to a 0.9% gain in unbleached kraft linerboard, while boxboard production was down 0.2% through May. Paperboard production for export was very strong, up 8.2% for containerboard and 21.1% for boxboard.

Canadian newsprint shipments totaled 861,000 metric tons in May, an increase of 2.3% over May 1989. Woodpulp shipments dropped to 615,000 tons, down 11.0%. Newsprint mills operated at 97% of capacity and pulp mills at 87%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	May	545	8.1	6,460	9.1
Uncoated groundwood (s)	May	144	-4.6	1,794	3.5
Coated paper (s)	May	621	7.1	7,257	3.5
Uncoated free-sheet (s)	May	938	0.0	11,562	2.3
Other printing/writing	May	131	4.0	1,615	5.9
Total packaging and other paper (s)	May	406	5.7	4,665	-4.5
Tissue	May	494	4.2	5,726	2.4
Total paper	**May**	**3,279**	**3.9**	**39,079**	**2.8**
Unbleached kraft paperboard	May	1,683	0.1	19,796	1.7
Semichemical medium	May	499	6.6	5,688	-0.3
Bleached paperboard	May	366	-4.2	4,491	1.2
Recycled paperboard	May	741	0.7	8,794	-1.5
Total paperboard	**May**	**3,289**	**0.7**	**38,769**	**0.6**
Total U.S. paper and paperboard output	**May**	**6,568**	**2.2**	**77,849**	**1.7**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Apr.	5,253	1.2	62,976	1.2
Market pulp production	Apr.	675	-6.0	8,537	-3.6
Wastepaper consumption at paper/board mills	Apr.	1,739	11.8	20,783	5.8
Pulpwood consumption (cords)	Apr.	8,260	2.7	99,786	2.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	May	27.219	1.1	132.309[6]	0.9
Containerboard inventories at U.S. box plants and mills	May 1	2,593	1.1		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Apr.	1,131	8.2	13,285	4.2
Imports of Canadian newsprint	Apr.	723	8.4	8,484[6]	3.7
U.S. paper exports (including products)	Apr.	615	25.8	6,879	11.4
Exports of unbleached kraft linerboard	Apr.	255	52.7	2,683	18.6
Exports of woodpulp	Apr.	538	2.5	5,838	-7.8
Norscan pulp inventories[4]	May 31	1,442	70.9		
Norscan pulp operating rates[4]	May	86%	85%	85%	89%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	May	861	2.3	3,934[6]	1.0
Operating rates	May	97%	96%	94%	97%
Inventories held by U.S. consumers	May 31	1,299	0.9		
Other paper/board shipments	May	637	5.8	3,064	7.1
Woodpulp shipments (export only)	May	615	-11.0	3,156	-9.1
Operating rates	May	87%	91%	88%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Corrugating medium: Slow demand, higher capacity growth make for competitive market

Grade structure: Corrugating medium, the middle fluting material used in corrugated containers, is made from both semichemical pulp and recycled fiber. In 1989, 76% of corrugating medium was semichemical and 24% was recycled medium. However, semichemical medium may contain 20% or more recycled fiber. Basis weights for corrugating medium are 22, 26, 33, 36, and 40 lb/1,000 ft².

Standard sheet weight is 26 lb, which accounts for about 77% of production (although heavier weights have been growing in popularity). Recycled medium for equivalent uses is normally produced in slightly higher weights.

Production/capacity. U.S. production of corrugating medium declined by 0.1% in 1989 to 7.5 million tons from the previous year. Semichemical medium production rose 0.5%, while recycled medium output declined 2.1%. The weakness reflected slower growth in U.S. box shipments, which were up 1.6% in 1989.

Box demand is expected to slow even further this year, with shipments forecast to rise 1.3%. Corrugating medium production is expected to increase by about the same amount to 7.6 million tons. Semichemical medium production is expected to be relatively flat, while recycled medium production should increase by almost 5%.

The higher growth for recycled medium reflects additional capacity, which is expected to increase 7.7% this year, according to the American Paper Institute. The Pratt Group started up a new 70,000-tpy recycled medium mill in Hartford City, Ind., earlier this year, and incremental expansion projects are being completed at a number of mills (including Stone Container Corp. at Uncasville, Conn., and Inland Container Corp. at Newport, Ind.).

Semichemical medium capacity, on the other hand, is expected to rise only 1.4% this year (and this probably does not include the closure of the 100,000-tpy Clinch River Corp. mill in Harriman, Tenn., in January). The loss of this capacity, however, is being offset by rebuilds that will be completed this year at a number of semichemical medium mills (including Inland at New Johnsonville, Tenn., and Willamette Inc. at Hawesville, Ky.) Operating rates for semichemical mills are expected to average close to 95% this year, while recycled mills will operate at only 85%.

Prices. The combination of sluggish demand, relatively high capacity growth for recycled medium (combined with lower wastepaper costs), and increased imports has led to highly competitive market conditions. Imports of medium from Canada have been running at a rate close to 160,000 short tpy this year, up 12% from a year ago, according to Canadian Pulp & Paper Assn. statistics. Erosion in box prices has squeezed margins of converters and added to pressure on containerboard prices.

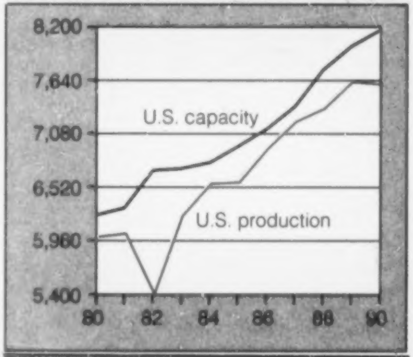
After reaching close to $400/short ton in second-quarter 1988, the price of semichemical medium began to erode and, by this summer, had dropped to about $310 to $330 in parts of the eastern U.S. with even lower prices reported, particularly for recycled medium.

Year-end transaction price history for 26-lb semichemical medium in the East is as follows: 1985, $240; 1986, $290-300; 1987, $350-360; 1988, $380-390; 1989, $360-370.

Outlook. Some strengthening in box shipments should lead to a pickup in the corrugating medium market in 1991. Box shipments are expected to rise about 2.6%—based on similar growth in U.S. industrial production vs this year's slower 1.1% growth. This would result in about a 2.5% increase in total corrugating medium production to 7.6 million tons in 1991.

The most rapid growth in production should be in recycled corrugating medium because of higher capacity growth. Operating rates for semichemical medium mills are forecast to average 95%, while recycled medium producers run at about 87% of capacity in next year. This may be enough to permit some firming in prices, particularly if wastepaper costs begin to increase and corrugated box prices begin to rise.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990e	1991e
Production			
Semichemical	5,691	5,700	5,815
Recycled	1,785	1,870	1,945
Total	7,476	7,570	7,760
Capacity[1]			
Semichemical	5,917	6,003	6,010
Recycled	2,040	2,197	2,236
Utilization rates			
Semichemical	96.2%	95.0%	96.8%
Recycled	87.5%	85.1%	87.0
Imports	143	160	165
Exports	137	132	145
Apparent U.S.			
consumption	7,455	7,598	7,780
lb/capita	59.66	55.28	56.05
GNP ratio	1.80	1.80	1.80

e = *Pulp & Paper* 1990 estimate.

1. American Paper Institute capacity data.

2. 1,000 tons/$ billion real GNP.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity			
	Semi-chem	Recycled medium	Total	Market share (%)
1. G-P	1,275[1]	—	1,275	19.5%
2. Stone	685	235	920	11.2
3. Weyco	700	—	700	8.5
4. Smurfit	120	405	525	6.4
5. Inland	240	270	510	6.2
6. Mead	390	—	390	4.8
7. IP	370	—	370	4.5
8. Willamette	170	160	330	4.0
9. PCA	280	—	280	3.4
10. Va. Fibre	265	—	265	3.2

Market share of top five companies:
47.9%
Market share of top ten companies:
67.9%
Total U.S. capacity (1990):
8,200

[1] Includes Great Northern Nekoosa acquired this year; G-P then announced plans to sell off mills with semichem medium capacity at Tomahawk, Wis (445,000 tpy) and Toledo, Ore. (192,000). Also included in the G-P total is 50% stake in a 170,000-tpy machine at Sonoco Products Co.'s Hartsville, S.C., mill.

Recycled newsprint projects proliferate; barely a manufacturer not eying one

Announcements and reports winding their way through the industry grapevine in recent months have tallied up a number of companies that are looking at installing deinking equipment at existing mills. Some are even considering greenfield projects. Rarely a week goes by that a new proposal doesn't sprout. And for the first time, a U.S. directory paper manufacturer has indicated it will use recycled fiber. Recycled directory paper is not made in North America currently.

Daishowa Forest Products Ltd. indicated in late June that it would add a 300-metric-tpd (110,000 tpy) deinking plant at its 452,000-tpy newsprint and directory paper mill in Quebec City, Que. Construction will begin in April 1991 and be completed in time for the plant to start up in first-quarter 1992. The C$56-million facility is expected to use 120,000-tpy of old newspapers (ONP) and used magazine stock. Earlier this year, Daishowa said that it would expand and upgrade its Quebec City boxboard mill at a cost of C$27 million. Combined, the boxboard and newsprint/directory paper mill investments boost Daishowa's Canadian-based wastepaper consumption to 170,000 tpy, making it a chief user of recycled fiber in Canada, the company indicated.

The parent of Daishowa divisions in North America, Daishowa Paper Manufacturing Co. of Japan, earlier indicated interest in installing deinking equipment at its Port Angeles, Wash., directory paper mill. Last year, the company had postponed plans at Port Angeles to add two machines, one producing newsprint and another producing directory paper.

Champion International Corp. also announced that it was going ahead with an $85-million deinking plant at its 429,000-metric-tpy Sheldon, Texas, newsprint mill. Construction of the 130,000-tpy washing and flotation deinking plant is scheduled to start in late 1990 and be completed by late 1992. It will make about 130,000 tpy of recycled fiber to supply about 20% of the furnish for the mill's three newsprint machines. Simons Eastern Consultants is the engineering contractor. A Champion spokesman said that the company was negotiating with major municipalities, such as Houston, Fort Worth, and Dallas, to set up collection systems that could supply about 160,000 tpy of ONP and used magazines to the mill.

Alabama River Newsprint Co. and Inland Empire Paper Co. in mid-June announced intentions to install deinking facilities. Both projects are expected to be completed in late 1991. Neither mill uses recycled fiber now, but that is where the similarity ends. Alabama River Newsprint is a brand

North American deinked newsprint projects, 1990-94.

Company/mill site	Startup	Capacity[1] (metric tpy)	Recycled content (%)	Recycled furnish (metric tpy)	Recycled furnish Grades
Definite					
Alabama River Newsprint, Claiborne, Ala.	End 1991	110,000[3]	40%	125,000	ONP and OMG
Atlantic Packaging, Whitby, Ont.	Jan. 1990	135,000[2]	100%	160,000	ONP and OMG
Augusta Newsprint, Augusta, Ga.	Late 1990	90,000[3]	var.	100,000+	ONP and OMG
Bowater, Calhoun, Tenn.	Dec. 1991	109,500[3]	var.	130,000	ONP and OMG
Canadian Pacific, Thunder Bay, Ont.	Mid-1991	100,000[3]	var.	120,000	ONP and OMG
Gatineau, Que.	Mid-1991	182,500[3]	var.	215,000	ONP and OMG
Champion, Sheldon, Texas	Late 1992	130,000[3]	20	160,000	ONP and OMG
Daishowa Forest, Quebec City, Que.	1992	110,000[3]	n.a.	120,000	ONP and OMG
Inland Empire Paper, Millwood, Wash.	Late 1991	40,000[3]	40%	45,000	ONP
Kruger, Bromptonville, Que.	May 1991	50,000[3]	var.	65,000	n.a.
North Pacific Paper, Longview, Wash.	Apr. 1991	230,000[2]	var.	200,000	ONP
Smurfit Newsprint, Northeast U.S.	1994+	255,000[2]	100	300,000	ONP and OMG
Stone-Consolidated, Shawinigan, Que.	End 1991	n.a.[3]	n.a.	n.a.	n.a.
Proposed					
Abitibi Price, Canada	n.a.	n.a.	n.a.	n.a.	n.a.
Atlantic Packaging, Whitby, Ont.	n.a.	n.a.[2]	100	n.a.	n.a.
Bear Island, Ashland, Va.	n.a.	n.a.[3]	n.a.	n.a.	n.a.
Boise Cascade, Kenora, Ont.	n.a.	n.a.[3]	40	n.a.	n.a.
West Tacoma, Wash.	n.a.	n.a.[3]	40	n.a.	n.a.
Donahue, Clermont, Que., or Montreal, Que.	n.a.	85,000[3]	n.a.	n.a.	n.a.
Georgia-Pacific, E. Millinocket, Maine	n.a.	n.a.[3]	40	n.a.	n.a.
Golden State, Pomona, Calif.	n.a.	210,000[2]	100	n.a.	n.a.
Newstech Recycling, Vancouver, B.C.	Mid-1991	122,500[4]	n.a.	140,000	ONP
Orford Recycling, Drummondville, Que.	n.a.	120,000[4]	n.a.	n.a.	n.a.
Smurfit Newsprint, Newberg, Ore.	n.a.	275,000[3]	50+	n.a.	n.a.
Westbrook Wood Products, Klamath Falls, Ore.	n.a.	200,000[2]	50	120,000	n.a.

1. Adding deinking capacity does not necessarily mean an increase in papermaking capacity.
2. New paper machines at greenfield or existing mills. 3. New deinking facilities to be added to existing mills.
4. Greenfield market deinked pulp mill.

ONP = Old newspapers. OMG = Old magazines. Var. = variable.

Sources: Canadian Pulp & Paper Assn., *Pulp & Paper Week* reports.

new 220,000-metric-tpy mill in Claiborne, Ala., that was scheduled to start up July 1. It is a 50:50 joint venture of Parsons & Whittemore Inc. and Abitibi-Price Inc. The latter is running nose-to-nose with Canadian Pacific Forest Products Ltd. for the distinction of being the world's largest newsprint producer. Parsons & Whittemore owns the neighboring Alabama River Pulp Co. Inc. mill in Claiborne, Ala.

Inland Empire's 66,000-tpy, one-machine newsprint mill in Millwood, Wash., is one of the smallest in North America. It is a wholly owned subsidiary of Cowles Publishing Co., which publishes the *Spokesman-Review* and *Spokane Chronicle* newspapers and sells to such newspapers as *The Seattle Times* and the two San Francisco, Calif., dailies.

Another Canadian deinking plant. Abitibi-Price also indicated in July that it would add deinking capacity to one of its newsprint mills in Canada and plans to make a decision on the location by fourth-quarter 1990. "We are committed to helping solve landfill problems in North America," said Bernd Koken, chairman and CEO of Abitibi. One knowledgeable source speculated that the Canadian mill most likely to be chosen for a deinking expansion would be the 165,000-tpy Thunder Bay, Ont., newsprint mill because of its proximity to urban supplies of wastepaper. The company indicated that with the Canadian deinking operation, 40% of its rated newsprint capacity would contain recycled fiber.

Abitibi had also announced that later this year a deinking plant will start up at another Abitibi joint-venture mill, Augusta Newsprint Co. The Augusta mill is expected to begin using recycled fiber in September, making it the first North American mill to be retrofitted with deinking capacity, the company said.

Prior to those announcements, a few buds had already appeared. Alberta Newsprint Co. is considering the addition of a deinking plant at its new 220,000-metric-tpy newsprint mill, which is slated to start up this month and use 100% chemi-thermomechanical pulp from abundant nearby stands of lodgepole pine, white and black spruce, and trembling aspen. The company said that it may be forced to use recycled fiber to produce 40% recycled-content newsprint as it plans to ship 60% to 65% of its newsprint to the U.S., where recycled newsprint is increasingly being mandated by the states. The deinking facility would produce up to 100,000 tpd of deinked pulp.

Meanwhile, another group in Alberta reportedly is interested in a recycled fiber facility allegedly backed by the Alberta government in the form of C$20 million in loan guarantees. The plant is expected to process 20,000 to 30,000 tpy of wastepaper into various publication grades, such as newsprint, magazine paper, and office stationery. Tombill Mines Ltd., Toronto, Ont., is said to be considering investing C$500,000 in the project. The other investors are unknown. ■

ANPA study compares recycled, virgin newsprint

The American Newspaper Publishers Assn. recently indicated that a three-year comparison of recycled newsprint and virgin newsprint found no significant optical or physical differences between them. The trade association expects that a variety of new recycled newsprint products will be developed in the coming years, which should aid further research on quality issues. An ANPA research project is already attempting to define the physical and optical properties of newsprint that affect newspaper printing.

In addition to its newsprint-quality testing, ANPA is also participating in two research projects to improve recycled newsprint production. One is being conducted by the U.S. Dept. of Agriculture's Forest Product Laboratory in Madison, Wis., on dry paper formation. The other is an in-house ANPA experiment with dry deinking, a process that would eliminate the need for water and chemicals to remove ink from old newspapers.

In 1989, ANPA's Technical Dept. tested 1,861 samples of newsprint (15% of which were recycled) from various newsprint mills. The department will increase the number of samples in 1990. Its recent study found that "the number of web breaks traditionally associated with recycled newsprint has been reduced to the point that its performance can be expected to resemble that of virgin newsprint," according to a recent report. ■

NEWSPRINT

North British Newsprint project back on track

Abitibi-Price Inc. said last month that it had reached a tentative joint-venture agreement with two publisher partners to proceed with construction of the North British Newsprint Ltd. (NBN) 100% recycled-fiber mill in Gartcosh, Scotland, after certain conditions are met. The Daily Telegraph plc and Mirror Group Newspaper Ltd. each agreed to acquire 25% of NBN; Abitibi would hold the remaining 50% ownership and operate the mill.

Conditions of the agreement include updating engineering studies and cost estimates, securing financing, and getting final approval from the three partners' boards of directors. The NBN project was originated by Sterling Fibre, a U.K. wastepaper merchant. Abitibi indicated in August 1989 that it would acquire those plans and build a C$340-million, 205,000-metric-tpy mill if certain conditions were met. Current estimates put the cost at C$400 million for a 220,000-metric-tpy mill, with 80% outside financing.

If all goes as planned, construction could begin by first-half 1991 and take two years to complete, according to Abitibi. The mill, which will incorporate washing and flotation technology, is expected to use about 270,000 tpy of old newspapers and old magazines. As part of the NBN acquisition, Abitibi and the two partners would also acquire half of Sterling Fibre's wastepaper division, Sterling Recycling, to handle wastepaper collections. A small portion of thermomechanical pulp purchased from outside sources will also be used in the furnish, with the percentage based on the quality of the wastepaper collected, said an Abitibi spokesperson. Most of the mill's output would be sold in the U.K. and the rest to customers in continental Europe.

"We are looking forward to establishing a newsprint manufacturing presence in the European Community," stated Bernd Koken, Abitibi's chairman and CEO. "What makes the project doubly exciting is that we will have the capability to service our present U.K. customers from either this domestic mill or our existing mills in Canada." This would be the third recycled newsprint project for Abitibi. ■

ISSUE FOCUS: MARKET PULP

World Market Pulp Output Up Slightly As Prices Flatten Out, Begin Decline

Hardwood bleached kraft and mechanical grades make largest gains as mills turn out 35.07 million tons in 1989, up 0.7% from 1988

By KELLY H. FERGUSON, Projects Editor

World market pulp output increased to 35.07 million tons in 1989, up approximately 0.7% from 1988, according to *Pulp & Paper International*'s 1989 Market Pulp Survey. Bleached softwood kraft (BSK) pulp remained the dominant market pulp grade although output declined slightly, but capacity of bleached hardwood kraft (BHK) pulp is increasing. Mechanical pulps are also making large gains.

North America maintained its lead as the major market pulp producer, turning out 47% of the world's total output (Figure 1). Both the U.S. and Canada will bring new capacity online within the next three years—524,000 tons in Canada and 143,000 tons in the U.S. Also, for the first time, the U.S. slightly exceeded Canada in producing salable market pulp, although about half of U.S. production is consumed domestically.

Other major capacity expansions are planned within the next three years in Brazil (505,000 tons), Japan (330,000 tons), Rep. Korea (200,000 tons), Portugal

FIGURE 1: **Geographic distribution of world market pulp production, 1989.**

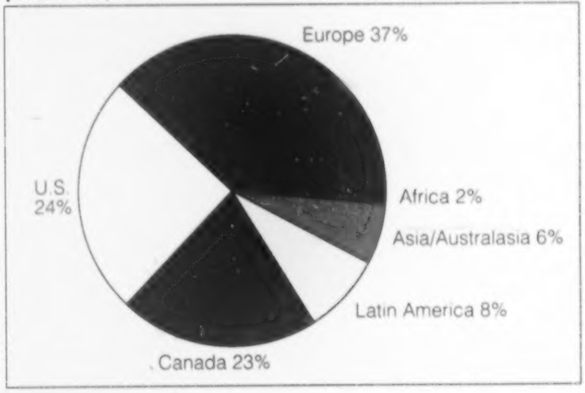


TABLE 1: **1989 market pulp output for selected countries (000 metric tons).**

	Sulfate (kraft)	Sulfite	Mechanical	Semi-chemical	Non-wood	Recycled	Total
Canada	6,810	615	736	—	—	—	**8,161**
U.S.	6,974	1,003	6	—	188	47	**8,218**
Sweden	2,770	380	544	—	—	—	**3,694**
Finland	1,704	222	99	—	—	60	**2,085**
Norway	280	250	264	35	—	—	**829**
Brazil	1,543	33	11	82	—	—	**1,669**
Japan	813	159	—	40	—	—	**1,012**
Portugal	1,121	119	—	—	—	—	**1,240**
France	643	253	3	—	—	—	**899**
Spain	693	36	44	—	5	—	**778**
New Zealand	248	—	100	—	—	—	**348**
Chile	549	—	—	—	—	—	**549**
Total	**24,148**	**3,070**	**1,807**	**157**	**193**	**107**	**29,482**
Total world	**27,513**	**4,555**	**1,968**	**360**	**540**	**134**	**35,070**

Note: Dissolving included in sulfate and sulfite. Fluff included in sulfate, sulfite and CTMP. Recycled is mainly deinked grades.

Note: All figures in this article are in metric tons. Pulp & Paper International*'s 1989 Market Pulp Survey, a summary of which is published here, is an 80-page mill-by-mill listing of nearly 300 market pulp mills worldwide, covering production, capacity, export percentage, and brand names used. This survey is priced at $577 and is available from PPI in Brussels. Telephone: (32-2) 538 6040/telefax: (32-2) 537 5626/telex: 24672 mfp b.*

TABLE 2: **1989 market pulp exports from major producers (000 metric tons).**

Major importers	**U.S.**	**Canada**	**Sweden**	**Finland**	**Norway**	**Brazil**	**Total**
Europe	1,818	2,269	2,592	1,427	589	318	**9,013**
U.S.	—	3,394	83	36	—	291	**4,344**
Canada	141	—	3	—	—	7	**151**
Asia/Australasia	2,143	2,111	372	186	28	238	**5,078**
Latin America	457	129	3	1	3	51	**644**
Africa	43	5	59	31	6	5	**149**
World total	**4,602**	**8,448**	**3,112**	**1,679**	**628**	**915**	**19,384**

(108,000 tons), and Spain (120,000 tons).

Based on 1988 market pulp export figures (Table 2), Canada remains the leading exporter, with almost 8.5 million tons shipped. The main importers of Canadian pulp are Europe (2.3 million tons), the U.S. (3.9 million tons), and Asia/Australasia (2.1 million tons).

The U.S. exported about half of its total market pulp production, shipping 4.6 million tons, with Europe (1.8 million tons) and Asia/Australasia (2.14 million tons) as the main recipients. The 4.6 million tons shipped in 1988 is almost double what the U.S. shipped in 1980 (2.65 million tons), representing a faster growth than any of the other countries listed in Table 2.

Europe is the major importer of market pulp at more than 9 million tons. However, while European imports increased only 4.3% between 1980 and 1988, imports in Asia/Australasia increased 87%—from 2.7 million tons in 1980 to 5.07 million in 1988.

Japan is the major force behind this Asian import boom, importing 1.57 million tons in 1980 but increasing 69.8% to 2.67 million in 1988. Other Asian countries, while importing smaller quantities, still had major increases from 1980 to 1988, including Hong Kong (518%), Rep. Korea (147%), and Taiwan (481%).

HARDWOOD, MECHANICAL MAKE GAINS. While BSK production continued a slight decline (0.3% drop from

FIGURE 2: **Grade distribution of world market pulp production, 1989.**

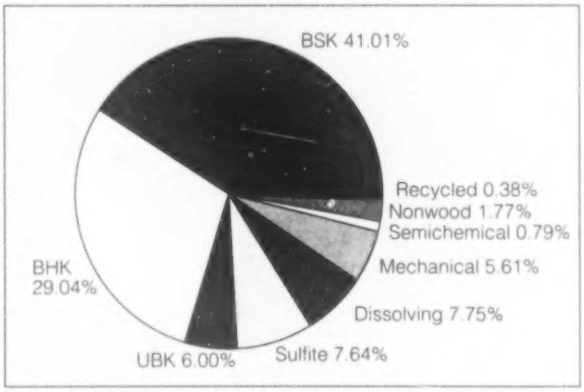


FIGURE 3: **World market pulp output, 1987-89.**

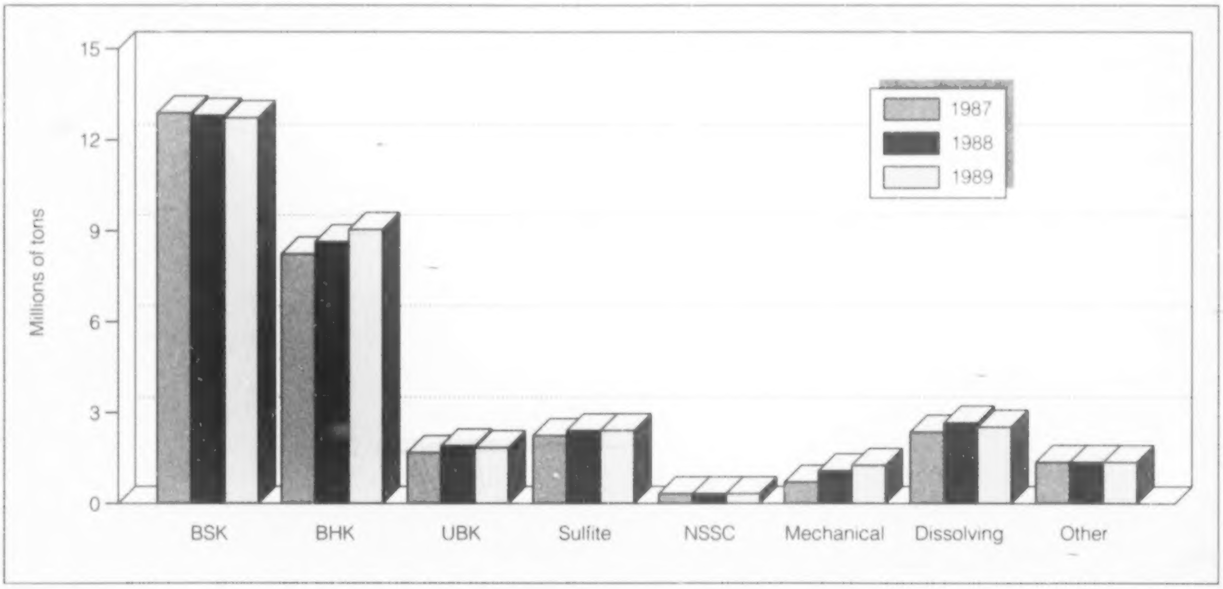


TABLE 3: **1989 market pulp output by grade and continent (000 metric tons).**

Grade	**Europe**	**North America**	**Latin America**	**Asia/ Australasia**	**Africa**	**Total**
BSK[1]	4,244	9,087	763	214	75	**14,383**
BHK[1]	4,299	3,339	1,402	972	171	**10,183**
UBK	557	566	407	397	176	**2,105**
Sulfite[2]	2,012	607	33	26	—	**2,678**
Dissolving	515	1,803	25	157	219	**2,719**
Semichemical	238	—	—	40	—	**278**
SGW	547	71	—	—	—	**618**
RMP/CMP/TMP	150	235	—	10	—	**395**
CTMP	368	436	61	90	—	**955**
Nonwood	94	188	110	177	53	**622**
Recycled[3]	87	47	—	—	—	**134**
Total	**13,111**	**16,379**	**2,801**	**2,803**	**696**	**35,070**

BSK = Bleached softwood kraft (sulfate). BHK = Bleached hardwood kraft (sulfate). UBK = Unbleached kraft (sulfate). SGW = Stone groundwood. RMP = Refiner mechanical pulp. CMP = Chemimechanical pulp. TMP = Thermomechanical pulp. CTMP = Chemi-thermomechanical pulp.

1. Bleached and semibleached. 2. Bleached and unbleached. 3. Mainly deinked grades.

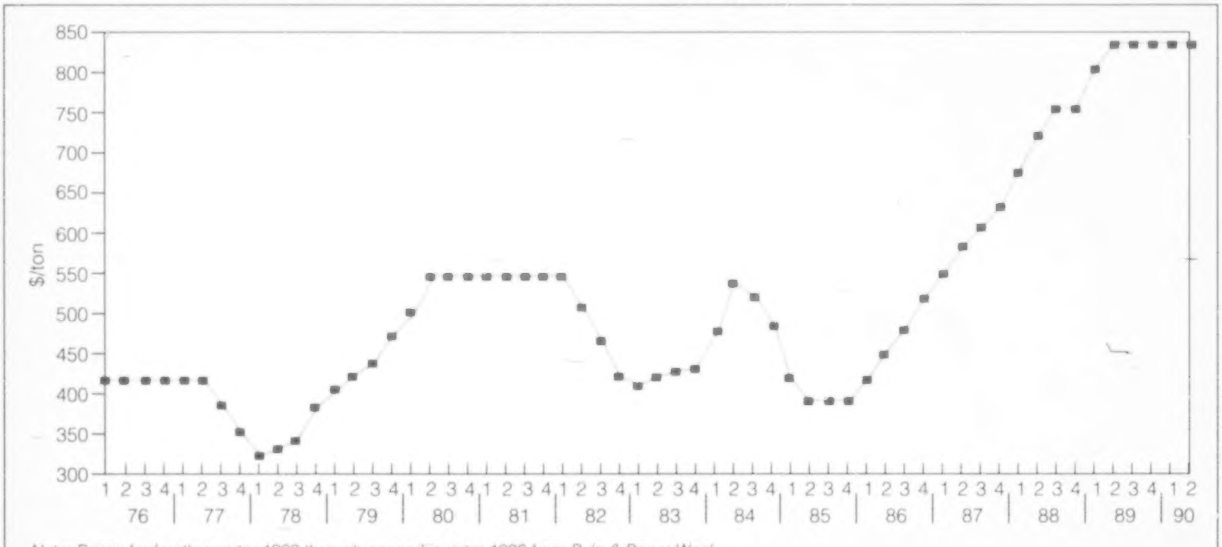
Note: Fluff included in sulfate, sulfite, and CTMP.

1988 figures), BHK continued modest production gains (3.4% increase from 1988) (Figure 3). These gains are expected to continue because of an estimated 1.5 million tons of new BHK capacity planned for the next three years. However, BSK still maintains a strong hold on total market pulp production at 41% (Figure 2), and 804,000 tons of new capacity are planned for the next three years.

Mechanical grades have also made significant gains from the period between 1987 and 1989, although these grades are only 5.61% of the total market. The boom in mechanical pulp has been led by chemi-thermomechanical pulp (CTMP), which increased 31.7% between 1988 and 1989. Other mechanical grades showing significant increases in the same period were thermomechanical pulp (TMP) with a 21% increase and chemimechanical pulp (CMP) with a 16.7% increase. Europe and North America (mainly Canada) were the leaders in adding new mechanical pulp capacity (Table 3).

As for market pulp pricing, Figure 4 shows that northern bleached softwood kraft (NBSK) prices (US$/ton) in Northern Europe have leveled out at $840/ton after a climb that began in first-quarter 1986. However, according to reports in *Pulp & Paper Week*, the current price is unstable and could begin to decline by the end of 1990. ■

FIGURE 4: **Northern bleached softwood kraft price, 1976-89, $/ton in Northern Europe.**



Note: Prices for fourth-quarter 1989 through second-quarter 1990 from *Pulp & Paper Week*.

Mill Clothing Survey Shows Quality Still High While Prices Remain Low

Mills give clothing manufacturers fairly high marks for paper machine clothing quality, while shopping for best bargains possible

By KEN L. PATRICK, Editor in Chief,
and KELLY H. FERGUSON, Projects Editor

A recent *Pulp & Paper* survey of 40 North American paper machines producing eight different grades of paper and board showed, as expected, that the highest average fabric cost per ton of production is in the forming section. Table 1 shows that of those machines reporting, the average cost of forming fabrics was $1.95/ton of production and that on the same basis pressing and drying costs averaged $1.51 and $0.60, respectively.

The typical paper machine in the study (Table 2) was mainly a fourdrinier type (76%), with a 223 in. width, an average speed of 2,243 fpm, and a daily production of 553 tons. The average age was 25 years, and only 26% had been rebuilt since original startup. Although the relatively small number of machines reporting in the various grades may not be statistically significant, the results do indicate typical mill clothing experiences in the forming, pressing, and drying sections of a paper machine.

Responses to the survey came from 13 U.S. states and three Canadian provinces. Those completing the questionnaires were predominantly paper mill superintendents, with a few production managers and other similar titles. This survey is the first of its kind known to be published in a magazine serving the U.S. and Canadian paper industry. In the future, *Pulp & Paper* will conduct more mill clothing surveys, and it is hoped that next year's study will include at least double the number of this year's participants.

MILL PURCHASING PRACTICES. Surprisingly, surveyed mills reported that they used an average of six different clothing suppliers. The range was three to five suppliers/mill—40%, six to eight/mill—42%, and nine

TABLE 1: **Highest fabric costs per ton of production were in the forming section, followed by pressing and drying.**

Grade	Forming	Pressing	Drying
Tissue/towel	3.52	3.58	1.40
Coated paper	2.36	1.99	1.01
Specialty paper[1]	2.35	2.10	0.55
Linerboard	1.65	0.43	0.18
Kraft paper	1.56	1.05	0.19
Market pulp	1.20	0.70	—
Corrugating medium	1.03	0.70	0.24
Newsprint	—	—	—
Total average, $	**1.95**	**1.51**	**0.60**

1. Includes ledger, forms, offset, Xerox

Grade	Former (%)		Average size (in.)	Average speed (fpm)	Average production (tpd)	Average original startup (year)	Rebuilt (%)
	Fourdrinier	Multiwire					
Tissue/towel	100		135	2,988	68	1957	0
Coated paper	60		214	2,130	463	1970	60
Specialty paper	50	40	280	2,665	537	1981	0
Linerboard	100	50	244	2,100	1,006	1960	65
Kraft paper	100		214	2,059	345	1955	25
Market pulp	100		223	497	967	1962	25
Corrugating medium	100		173	1,708	410	1956	33
Newsprint		100	304	3,800	625	1979	0
Total average	**76**	**24**	**223**	**2,243**	**553**	**1965**	**26**

TABLE 2: **Typical paper machine in the study was a 25-year-old fourdrinier, 233 in. wide, operating at 2,243 fpm to produce 553 tpd.**

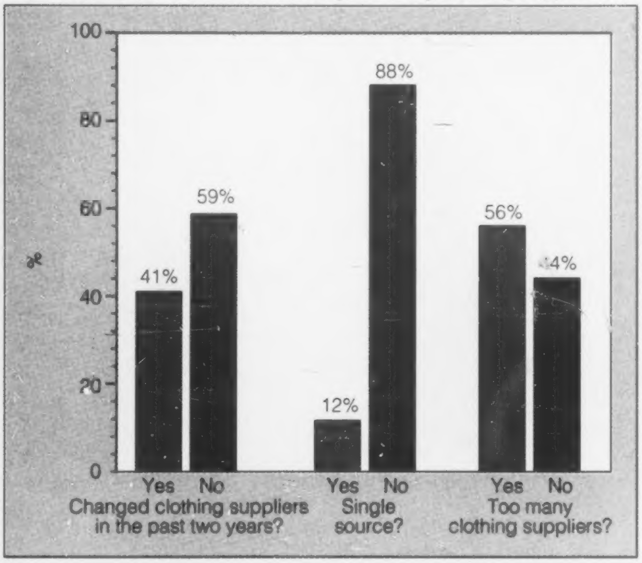


FIGURE 1: **Mills surveyed typically have not changed clothing supplier in the past two years, generally do not single source, and feel that there are currently too many clothing suppliers.**

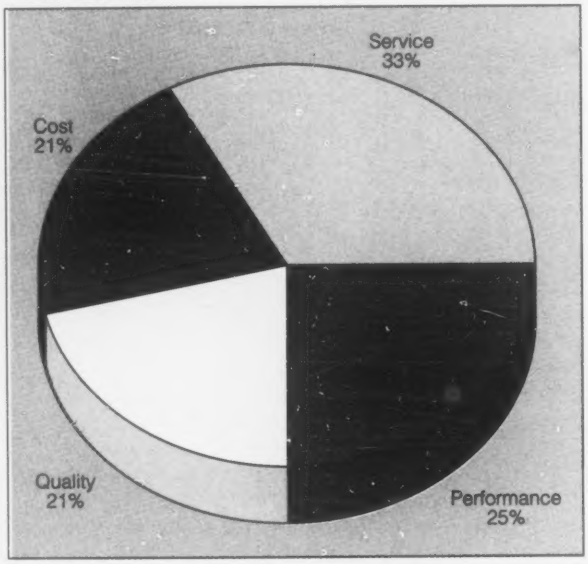


FIGURE 2: **Service was listed most often among key mill criteria for selecting paper machine clothing, followed by performance, cost, and quality.**

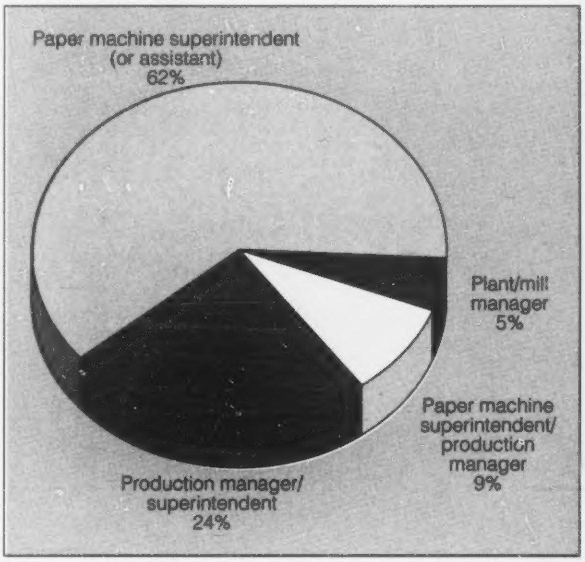


FIGURE 3: **Who makes clothing purchasing decisions? Most mills reported it was the paper machine superintendent and/or production manager.**

to 11/mill—18%. These figures are particularly interesting when compared with survey responses in Figure 1 showing that few, if any, mills single source (some single source by position), many have changed suppliers in the past two years, and yet most feel that there are currently too many clothing suppliers in North America. Obviously, most mills do a lot of shopping around for clothing, and the more suppliers there are, the better their chances of finding a bargain.

In selecting clothing suppliers, most mills (33%) listed service as the most important criterion (Figure 2), followed by performance (25%) and quality and cost (both at 21%). As far as who actually buys the clothing, Figure 3 shows that 62% of the mills reported this to be the paper machine superintendent's responsibility (or the responsibility of the superintendent's designated assistant). The production manager or superintendent made clothing purchasing decisions at 24% of the mills, and a combined team of the paper machine superintendent and production manager handled the buying at 9% of the mills. A few mills (5%) said that their clothing was bought by the mill manager.

In answer to the question of how their current clothing costs per ton of production compare with those of two years ago, most mills reported either a decrease (38%) or no change (38%). Only 24% of the mills said that their clothing costs had increased during this period.

In relation to other questions, most (65%) of the mills reported no problem with clothing contamination at their mills. Some 71% said they required their material suppliers to have a statistical process control/statistical quality control (SPC/SQC) program in effect. All respondents agreed that today's clothing suppliers are generally "doing a good job."

FORMING SECTION. The highest cost for forming fabrics, according to the survey, was in tissue/towel grades, at $3.52/ton of production (Table 1), followed by coated and specialty paper. The less expensive forming fabrics were in the unbleached kraft grades and mar-

TABLE 3: **Forming fabrics were of both the single- and double-layer types, but double-layers were predominate in the press machine, as were monofilament fabrics in the dryer.**

Grade	Forming			Pressing					Drying	
	Metal	Single layer	Double layer	Single layer	Double layer	Triple layer	Seamed	Endless	Monofilament	Multifilament
Tissue/towel	15	85		32	63	5		100	100	
Coated paper			100		86	14	29	71	82	18
Specialty paper			100		80	20		100	100	
Linerboard		50	50	45	36	19	31	69	85	15
Kraft paper		75	25	11	89		11	89	83	17
Market pulp		75	25	70	20	10	50	50	100	
Corrugating medium		100		50	50		40	60	83	17
Newsprint			100	66	34			100	50	50
Total average	**2**	**48**	**50**	**34**	**57**	**9**	**20**	**80**	**85**	**15**

ket pulp. Forming fabrics were fairly evenly split between single-layer and double-layer types (48% and 50%, respectively), with a few older tissue machines still using metal wires (Table 3). While coated and fine specialty paper machines tended to use double-layer forming fabrics, the unbleached kraft grades leaned toward single-layers. No fabric costs were shown for newsprint because of the low level of response for this grade.

The average forming fabric life was 92 days (Table 4). Chemical market pulp, with its high grade furnish (generally containing no additives) and relatively slow machine speeds, had the highest average forming fabric life at 185 days, followed by specialty paper (115 days) and kraft boards and paper (97 and 95 days).

PRESS SECTION. The tissue/towel grades, mainly because of their light weights, also pay the highest prices for press fabrics, at $3.58/ton of production (Table 1). As with forming fabrics, specialty paper ($2.10) and coated paper ($1.99) were next, followed by kraft paper/boards and market pulp at less than a third of the per-ton-of-production costs for tissue.

As Table 3 shows, most press fabrics were double-layer (57%) vs 34% for single-layer wet felts. A few triple-layer laminated press fabrics (9%) were used. None of the coated and specialty paper mills surveyed used single-layer press fabrics, whereas the other grades were fairly evenly split between single- and double-layers. Most mills (80%) reported that they were using endless press felts, but 20%, mainly in the market pulp and unbleached kraft grades, were using seamed felts. Some of the benefits reported for seamed felts included "easier and faster to install, less downtime, improved safety, and less dirty when installing." Reported problems included "seam slap, wear and failure, higher costs than endless design, top roll oscillation, and sheet marking."

In the press section, market pulp again had the longest fabric life (105 days), followed by kraft paper (71 days) and the other grades with approximately the same life span (40 to 50 days) (Table 4). The life of newsprint press fabrics is shown to be very low at only 26 days, but again this grade had a low level of response (only two machines).

TABLE 4: **Fabric life in the dryer section was an outstanding 307 days, with press fabrics averaging 54 days of operating life.**

Grade	Forming	Pressing	Drying
Tissue/towel	63	43	331
Coated paper	73	39	218
Specialty paper	115	47	433
Linerboard	97	57	279
Kraft paper	95	71	288
Market pulp	185	105	500
Corrugating medium	57	41	186
Newsprint	50	26	220
Total average days	**92**	**54**	**307**

DRYER SECTION. Dryer fabrics, due to their long average operating life (307 days as shown in Table 4), compared with forming and press fabrics were also the least expensive of fabrics at an average cost of $0.60/ton of production (Table 1). As expected, tissue and coated paper dryer fabric costs were the highest at $1.40 and $1.01/ton of production, respectively. Costs for the kraft brown paper grades averaged only $0.20/ton of production.

The average dryer fabric life for market pulp machines was an extremely high 500 days, vs only 186 days (unexplainably) for corrugating medium. Specialty paper machines also had long dryer fabric lives (433 days), as did tissue machines (331 days). Most (85%) of the drying sections on the 40 machines surveyed used monofilament fabrics (Table 3), with newsprint being the only grade reportedly using a high percentage of multifilament (50%).

No meaningful conclusions could be made about the use of pin or spiral seams on monofilament fabrics. However, spiral seams were said to be "easier to seam" by some companies and yet more difficult to "fit together" by others. Several mills reported seam failure with spiral seams. Most mills using pin seams reported less sheet marking and improved performance. ■

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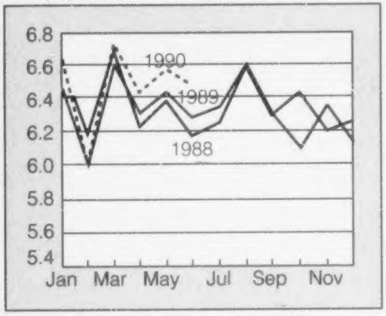
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in June, up 2.2% from a year earlier, according to the American Paper Institute. The seasonally adjusted annual rate of production climbed to 77.8 million tpy for the first half, up 1.7% from June 1989. Second-quarter production in 1990 was 1% higher than the first quarter of the year and 2.5% higher than second-quarter 1989.

Among major grades, healthy growth in newsprint continued to lead the way, but most other paper grades showed strength as well. Printing and writing shipments were up 2.8% from June 1989, as new and unfilled orders surged dramatically for coated paper and uncoated free-sheet.

Containerboard was up 1.1% through June, thanks to a 13.4% increase in production for export. A 20.0% increase in boxboard production for export was offset by a 1.5% decline for the domestic market.

Canadian newsprint shipments totaled 804,000 metric tons in June, down 0.6% from a year earlier, while mill operating rates held steady at 95%. Woodpulp shipments plunged to 615,000 tons, down 13.4% from June 1989. Pulp mills operated at 82% of capacity in June, down from 93% a year earlier. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	June	539	8.2	6,462	8.9
Uncoated groundwood (s)	June	145	4.3	1,785	4.0
Coated paper (s)	June	603	4.0	7,255	3.5
Uncoated free-sheet (s)	June	910	2.7	11,454	2.4
Other printing/writing	June	135	3.1	1,617	6.7
Total packaging and other paper (s)	June	394	-1.7	4,676	-4.0
Tissue	June	479	2.1	5,729	2.4
Total paper	**June**	**3,205**	**3.3**	**38,978**	**2.8**
Unbleached kraft paperboard	June	1,681	2.4	19,859	1.9
Semichemical medium	June	467	-0.2	5,675	-0.3
Bleached paperboard	June	376	-4.6	4,499	0.3
Recycled paperboard	June	738	2.8	8,806	-1.2
Total paperboard	**June**	**3,262**	**1.2**	**38,839**	**0.7**
Total U.S. paper and paperboard output	**June**	**6,467**	**2.2**	**77,817**	**1.7**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	May	5,164	1.5	62,778	1.2
Market pulp production	May	698	-3.2	8,503	-3.6
Wastepaper consumption at paper/board mills	May	1,799	10.8	20,945	5.8
Pulpwood consumption (cords)	May	8,113	0.0	99,300	2.1
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	June	26.265	-1.8	158.704[6]	0.5
Containerboard inventories at U.S. box plants and mills	June	12,542	1.9		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	May	1,064	1.6	13,268	2.3
Imports of Canadian newsprint	May	717	-0.8	8,507[6]	2.1
U.S. paper exports (including products)	May	547	-7.4	6,816	7.2
Exports of unbleached kraft linerboard	May	202	-12.9	2,631	11.1
Exports of woodpulp	May	443	-12.1	5,733	-8.7
Norscan pulp inventories[4]	June 30	1,397	80.7		
Norscan pulp operating rates[4]	June	86 %	87 %	85 %	89 %
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	June	804	-0.6	4,738[6]	0.7
Operating rates	June	95 %	95 %	95 %	97 %
Inventories held by U.S. consumers	June 30	1,308	0.6		
Other paper/board shipments	June	615	9.8	3,675	7.5
Woodpulp shipments (export only)	June	651	-13.4	3,807	-9.9
Operating rates	June	82 %	93 %	87 %	94 %

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Uncoated groundwood: Uncertain economy may weaken various primary markets

Grade structure: Uncoated groundwood paper has physical properties similar to newsprint but sustains higher brightness levels and smoother surfaces. Gloss added by supercalendering allows high-end uncoated groundwood paper to compete with lightweight coated (LWC) groundwood paper. Brightness levels range from 64 to 74 Elrephro, compared with 56 to 62 for standard newsprint and 68 to 84 for LWC. Basis weights range from 20 to 45 lb/3,300 ft^2. Primary uses for uncoated groundwood paper include preprinted newspaper inserts and direct mail flyers, catalogs, lower-cost business forms, Sunday newspaper magazines, and telephone directories.

Production/capacity: Groundwood paper production in North America has continued to grow in the past few years, mostly in supercalendered (SC) and directory grades. Conversion of newsprint machines to make groundwood specialties has continued, prompted, in part, by newsprint overcapacity. U.S. mills shipped 1.754 million tons in 1989, up 8% from 1988. Canadian uncoated groundwood shipments rose 9% to 1.611 million metric tons in 1989, about 80% sent to the U.S.

Groundwood paper capacity in North America is continuing to rise. Canadian uncoated groundwood capacity increased 14.3% in 1989 to 1.776 million metric tpy. Another 7.6% increase is expected this year. U.S. mill capacity rose 6.4% in 1989 to 1.846 million short tpy but is expected to decline 2.1% in 1990 to 1.808 million tpy.

Some recent and future projects are St. Marys Paper Inc., Sault Ste. Marie, Ont. (131,000 short tpy, 1988); Lake Superior Paper Industries (245,000 short tpy); Stone-Consolidated Inc., Grand Mère, Que. (110,000 short-tpy net, 1989); and Kruger Inc., Corner Brook, Nfld. (70,000 metric tpy conversion). Daishowa America Co. has delayed a new 150,000-tpy directory paper machine in Port Angeles, Wash.

Outlook: Demand growth rates are estimated at 4.1%/year through 1999. End-use demand will stay relatively healthy for the remainder of the 1990s. Oversupply in Europe will continue to affect pricing in North America.

Telephone directories should average about 2% to 4%/year for the decade. Some consolidation in the directory publishing industry should continue, but the number of pages should rise.

SC paper could corner 84% of the catalog paper market by 1998. But machine-finished grades will lose market share in this category. Consumption of groundwood paper for catalogs may rise about 0.15%/year through 1993. Overall demand for SC paper is advancing 8% to 10%/year.

Paper for business forms will advance by about 7.5%/year through 1993, while stationery and tablets will gain only 1.6% annually.

Groundwood consumption for preprinted advertising inserts is expected to grow almost 6.5% annually, while other forms of commercial printing may consume 3.5% more paper each year.

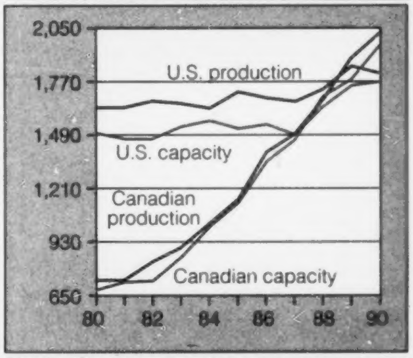
Magazine publishers and printers are likely to use about 2.8%/year more uncoated groundwood paper, shifting from lower grades to SC.

Uncoated groundwood paper for books is likely to drop 0.9% annually through 1993.

Prices: Price increases on most grades were announced in 1990 after a rough year or so of price pressure. Not among those grades hiked was premium SC, which follows LWC rather than the rest of the uncoated groundwood market. Most grades were still being discounted from list though demand stayed relatively strong.

Year-end list prices for 34-lb supercalendered ($/short ton) are: 1987, $704; 1988, $830; 1989, $830; 1990, $830; mid-year 1990, $830, but discounted $20-$30/ton. Prices for 35-lb offset, 65 brightness are: 1987, $565; 1988, $675; 1989, $655; mid-year 1990, $655, but discounted $20/ton. For standard 30-lb rotonews: 1987, $541; 1988, $650; 1989, $650; mid-year 1990, $680, discounted to $650. For 15-lb, 65 brightness forms: 1987, $560; 1988, $720; 1989, $700; mid-year 1990, $615.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	**1990e**	**1989**	**1988r**
Production	1,765	1,754	1,624
Capacity[1]	1,808	1,846	1,735
Utilization rate	97.6%	95.0%	93.6%
Imports	1,552	1,470	1,404
Exports	90	71	24.01
Apparent U.S. consumption	3,227	2,153	2,962
lb/capita	25.77	25.30	24.01
000 tons/$ billion real GNP (1982)	0.76	0.76	0.74
Canada[2]			
Production	1,971	1,776	1,628
Capacity	2,027	1,884	1,648
Exports	1,695	1,527	1,382
Utilization rate	97.2%	94.3%	98.8%

e = *Pulp & Paper* 1990 estimate. r = Revised.

1. American Paper Institute.

2. Canadian Pulp & Paper Assn. Capacity probably understated by at least 200,000 tons.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 short tpy)	**Market share (%)**
1. Abitibi-Price	525	14.4
2. MacMillan Bloedel[1]	444	10.2
3. Canadian Pacific	430	9.9
4. Stone-Consolidated	423	9.7
5. Georgia-Pacific Corp.[2]	212	6.6
6. Boise Cascade	270	6.2
7. Lake Superior Paper	240	5.5
8. Champion International[3]	229	5.5
9. Domtar	190	4.4
10. St. Marys Paper	185	4.3
11. Madison Paper	175	4.0

Market share of top five companies:
53.7%

Market share of top ten companies:
83.1%

North American capacity (1990):
3,789 million tons
U.S.: 1.762; Canada: 2.027[4]

1. MacMillan Bloedel & Fraser owned by Noranda Forest Inc. 2. (Great) Northern Paper Div., Millinocket, Maine. 3. 1989 production. 4. Customs clasification revisions will probably increase Canadian capacity by 200,000 or more.

SALES AND EARNINGS

U.S. paper profits tumble, Canada plummets

Despite higher production, U.S. paper industry profits continued to spiral downward in the second quarter due to lower prices for many grades. Second-quarter earnings declined 27% from a year ago, although sales increased 4.5%, according to a *Pulp & Paper Week* survey of 30 U.S. companies. While a few companies were able to buck the trend and post higher results, several large companies suffered earnings drops of 40% to 50% or more. Tissue producers were among the best performers in the U.S. and Canada, while companies with heavy exposure to newsprint, market pulp, and containerboard generally did the worst. Nevertheless, there were signs that the rapid slide in North American industry profits that gained momentum in fourth-quarter 1989 may be slowing down.

Printing and writing paper producers are being helped by stronger demand and a partial recovery in uncoated free-sheet prices. Newsprint may have bottomed out in the second quarter with the successful June price increase. And the linerboard market also has been showing signs of stability helped by steady domestic box cutup and strong export demand. As a result of this, a number of chief executives expressed at least guarded hope for the future. "We expect demand and operating rates to remain healthy in the months ahead," noted Eugene Cartlege, CEO of Union Camp Corp.

Georgia-Pacific Corp. said stronger sales from its building products and pulp and paper units plus higher prices for softwood lumber and structural panels mitigated a 38% drop in profits. But a tripling of interest expense to $185 million from $66 million in 1989 offset gains. Payments jumped due to the March takeover of Great Northern Nekoosa Corp. for $3.74 billion. Building product profits for the second quarter rose 12.7% to a record $159 million, while pulp/paper profits climbed 8.3% to $261 million.

"Compared to last year, earnings were lower due to price declines for uncoated printing and writing papers and containerboard," said John A. Georges, CEO of International Paper Co. "Our quarter-to-quarter improvement was due to strong performances by our European and specialty products businesses." Europe's economy is expanding at twice the rate of U.S. growth, Georges said, as he expressed "guarded optimism" for the third quarter.

Income from paper operations declined markedly for Boise Cascade Corp. as the company cited lower prices for most grades, especially newsprint and uncoated free-sheet. Stone Container Corp.'s profits plummeted primarily due to continued discounting of product pricing, increased interest expense, and higher tax rates, the company said. The inclusion of figures for Stone-Consolidated Inc. of Canada pushed up sales 3.6% in the second quarter and 15% for the first six months of 1990.

Champion International Corp. said nonrecurring items assisted income but only partially offset second-quarter production losses resulting from

U.S. paper/products industry results.

	Second-quarter 1990 ($000)			
Paper companies	**Sales 1990**	**% change**	**Earnings 1990[1]**	**% change**
Badger Paper	$19,495	−0.9%	$964	−19.7%
Boise Cascade Corp.	1,058,250	−3.9	23,030	−69.4
Bowater Inc.	342,333	−5.8	14,201	−62.6
Champion International Corp.	1,260,013	−2.3	63,469	−44.3
Chesapeake Corp.	222,774	4.4	7,502	−37.4
Consolidated	237,974	−0.2	38,072	−12.7
Federal Paper Board Co. Inc.	317,203	2.7	34,571	−32.7
Gaylord Container Corp.-3rd Q	172,200	−11.0	(6,900)	NM
Georgia-Pacific Corp.	3,519,000	33.3	107,000	−37.8
P.H. Glatfelter Co.	156,907	0.2	22,264	−10.4
International Paper Co.	3,200,000	6.7	185,000	−19.2
James River Corp. 5/23	1,522,113	−7.4	50,827	−31.6
Kimberly-Clark Corp.	1,612,700	15.5	80,400	−20.6
Longview Fiber Corp. 4/30	163,344	−3.1	15,538	0.4
Louisiana-Pacific Corp.	501,500	−4.7	38,000	−21.5
Mead Corp.	1,228,900	1.8	46,100	−26.4
Mosinee Paper Corp.	52,700	−9.7	3,184	−12.5
Pentair Inc.	294,924	−3.0	7,049	−31.8
Pope & Talbot Inc.	143,770	−10.4	8,577	−23.1
Potlatch Corp.	321,234	8.5	32,348	25.8
Scott Paper Co.	1,321,000	5.3	74,600	4.3
Sonoco Products Co.	420,725	1.3	27,554	−3.5
Stone Container Corp.	1,429,800	3.6	29,500	−53.6
St. Joe Paper Co.	148,241	−8.0	10,401	−38.3
Temple-Inland Inc.	587,400	20.1	65,700	24.2
Union Camp Corp.	715,058	0.5	58,430	−28.2
Wausau Paper Mills Co. 5/31	88,190	10.1	5,842	3.4
Westvaco Corp. 4/30	582,972	3.8	45,970	−21.0
Weyerhaeuser Co.	2,392,418	−9.5	114,256	−26.2
Willamette Industries Inc.	491,640	0.0	43,613	−7.4
Total	**$24,524,778**	**4.5%**	**$1,247,062**	**−26.9%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items where possible. ( ) = losses.
2. **Kimberly-Clark:** Second-quarter 1990 income includes a net charge of $44 million related to pending sale of a Canadian subsidiary. **Pope & Talbot:** Second-quarter 1990 income includes gain of $1.5 million from sale of timberland. **Stone-Container:** Second-quarter 1990 income includes net gain of $3.1 million from sales of timberland. 1989 income includes $1.5-million gain from sale of assets. NM=not meaningful.

rebuilding and maintenance projects. The company saw a 44.3% plunge in income compared with 1989, suffering a sharp drop in earnings at its Brazilian subsidiary following radical economic reforms imposed by the new government.

Mead Corp. cited scattered operational problems at Escanaba, Mich., and Chillocothe, Ohio, mills that offset a strong performance by its Packaging & Paperboard Group, said CEO Burnell R. Roberts.

"The record level of earnings in the second quarter of 1990 is principally due to the impressive performance of Scott Worldwide's U.S. tissue business," said Scott Paper Co. CEO Philip E. Lippincott. He noted that the S.D. Warren Div. printing and publishing paper unit was improving but was performing below expectations. Scott posted a 4.3% gain in income from a year earlier, with a 5.3% increase in sales.

Canadian profits evaporate. Canada's pulp and paper industry ran closer to the break-even level in the second quarter as companies continued to reel from the rising value of the Canadian dollar, poor prices for newsprint, and sluggish demand for market pulp. A survey of 15 companies showed an aggregate profit of C$100 million for the second quarter of 1990, down 75% compared with industry earnings of C$400 million during the same period in 1989. But after adjusting for nonrecurring items, the group probably ran at much less profit as sales declined 3.7% from a year earlier. Most producers noted some improvement in newsprint shipments due to customer inventory building in anticipation of labor unrest and a recent newsprint price increase. But profits were hurt in the second quarter by heavy downtime at market pulp mills to reduce inventories and higher stumpage costs in British Columbia. The outlook for the Canadian industry remains gloomy for the third quarter, with market pulp prices starting to slide, further mill downtime (either planned or because of strikes), and the Canadian dollar still climbing.

Red ink flowed at Abitibi-Price Inc., which reported a loss of C$3.7 million. But excluding a charge of C$28.9 million for unusual items, which mostly involved the cost of staff reductions associated with the company's restructuring plans, the company posted after-tax earnings of C$14.1 million. "While the restructuring plan has had a markedly negative impact on 1990 earnings," said Abitibi-Price CEO Bernd K. Koken, "the long-term effect will be increased profitability."

Canadian Pacific Forest Products Ltd. cited weak markets in all business sectors except tissue products and losses at its two new joint-venture newsprint mills at Gold River, B.C., and Usk, Wash. MacMillan Bloedel Ltd. suffered a 58% decline in second-quarter earnings, citing higher costs, the stronger Canadian dollar, and market-related pulp mill downtime. In newsprint, the company noted, recent machine shutdowns and conversions have reduced industry oversupply, and the situation in this market "may not be as acute as originally anticipated."

Companies that bucked the trend included Fletcher Challenge Canada Ltd. and Scott Paper Ltd., which reported a 6% increase in profits for the second quarter due to healthy tissue demand that offset higher interest expenses incurred for a recent acquisition and improvements, including completion of a new recycled fiber plant at Crabtree, Que.

Costly environmental projects. As earnings fall, Canadian pulp mills must cope with expensive environmental rules, as Environment Canada works "madly" to finish studies necessary to develop federal limits on the release of chlorinated organic pollutants (AOX) in pulp mill effluent. These regulations will complement standards proposed earlier this year that cover conventional pulp and paper industry pollutants as well as dioxins and furans. The Canadian Pulp & Paper Assn. has estimated that the bill for this first set of regulations and some related improvements could reach C$5 billion.

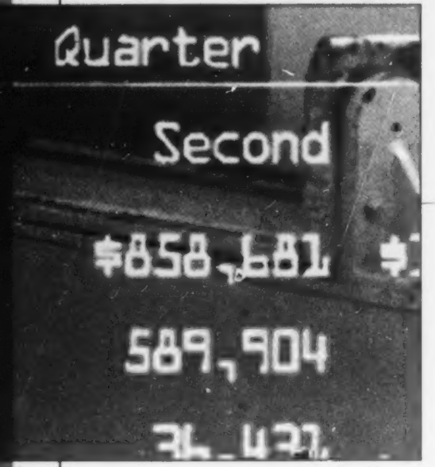
The industry outlook is not going to brighten any time soon. "Profits this year will continue to deteriorate, and next year will be just as difficult," said Brian Topp, forest product analyst with Capital Group Securities Ltd. "The industry will trim back all unnecessary capital expenditures" and may have to finance the essential projects through bank loans. Topp added that firms such as Noranda Forest Inc. and Domtar Inc. that already have heavy debt loads "will have to try and catch up in 1992-94, when they start to do better." ■

Canadian paper/products industry results.

	Second-quarter 1990 (C$000)			
Companies	**Sales 1990**	**Change 1990/89**	**Earnings 1990[1]**	**Change 1990/89**
Abitibi-Price Inc.	$803,100	−3.3%	$ (3,700)	NM
Canadian Pacific Forest Products Ltd.	650,600	−12.3	6,600	−90.9%
Canfor Corp.	236,700	6.5	30,500	18.7
Crestbrook Forest Industries Ltd.	56,709	−17.6	3,523	−61.2
Doman	150,885	84.9	2,916	−70.3
Domtar Inc.	608,000	−7.3	(29,000)	NM
Donohue Inc.	158,600	−5.7	5,900	−45.9
Fletcher Challenge Canada Ltd.	299,000	−18.3	37,000	15.6
MacMillan Bloedel Ltd.	806,900	−6.4	28,800	−57.8
Noranda Forest Inc.	1,228,000	−2.0	(4,000)	NM
Repap Enterprises Corp. Inc.	305,500	12.0	4,200	−81.0
Rolland Inc.	104,297	−9.2	(2,088)	NM
Scott Paper Ltd.	117,670	1.0	3,200	5.8
Tembec (3rd Q)	62,357	−5.3	4,539	−57.1
Weldwood	190,400	1.9	6,800	−57.5
West Fraser	149,400	−1.5	5,100	−28.2
Total	**$5,928,118**	**−3.7%**	**$100,290**	**−74.9%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. **Abitibi-Price:** 1990 income includes a C$28.9-million charge for unusual items, mostly the cost of staff reductions. **Canfor:** 1990 income includes a C$26.2 million after-tax gain from the sale of its High Level, Alta., sawmill division. **Domtar:** 1989 results restated to reflect discontinued operations. **Fletcher Challenge:** 1990 income includes an after-tax gain of C$20.7 million from the sale of its oriented strandboard plant in Minnesota.

( ) = losses. NM = Not meaningful.



Solid Waste Issue Creates Boom in Recycled Fiber Capacity Growth

Over half of proposed secondary fiber projects are new since last fall

By CARL ESPE, News Editor

Faced with a solid waste problem that threatens to grow to crisis proportions, more than a dozen states are considering or have already passed laws mandating increased use of recycled fiber in newsprint and other paper grades. This situation has led to a boom in secondary fiber expansion projects and proposals, as papermakers in the U.S. and Canada scramble to position themselves for what promises to be a very different market. The accompanying tables from *Pulp & Paper Project Report* describe over 60 projects, ranging from new deinking capacity for newsprint and tissue mills to wastepaper processing projects for containerboard and boxboard facilities. Several proposed market-deinked pulp facilities are also listed.

Illustrating the fast pace of change in this area, well over half of these projects are new since last fall. In addition, three major deinking plant installations and one new recycled newsprint mill that were listed as "proposed" last fall have now been approved: Bowater Southern, Calhoun, Tenn.; James River Corp., Halsey, Ore.; Daishowa Forest Products Ltd., Quebec City, Que.;

TABLE 2: **Wastepaper processing projects at Canadian mills.**

Start date	Cost ($ million)	Company, mill site	Additional information
Canada (C; short tons)			
none	—	Abitibi-Price Inc., undecided mill	Install deinking capacity to produce furnish for recycled newsprint
none	—	Alberta Newsprint, Whitecourt, Alta.	Considering 100,000-tpy deinking plant for recycled newsprint production
1990	—	Atlantic Packaging, Whitby, Ont.	New 200,000-tpy recycled tissue/newsprint mill
none	—	Boise Cascade Canada Ltd., Kenora, Ont.	Considering installation of a deinking plant to allow production of recycled newsprint
1991	175.0	Canadian Pacific Forest Products Ltd., Gatineau, Que. and Thunder Bay, Ont.	Install 500-tpd washing and flotation deinking line at Gatineau and 275-tpd line at Thunder Bay for recycled newsprint furnish
none	—	Cascades, Cap-de-la-Mad., Que.	Proposed 55,000-tpy deinked pulp plant; seeking provincial financing
1990	20.0	Cascades (East Angus) Inc., East Angus, Que.	Install 60-tpd deinking plant to allow use of higher wastepaper grades
1990	—	Cascades Inc. (E-P-C), Kingsey Falls, Que.	$30-million recycled tissue expansion includes a new deinking line
1992	56.0	Daishowa Forest Products Ltd., Quebec City, Que.	Install 300-tpd Japanese-technology deinking plant for newsprint/directory production
none	53.0	Kruger Inc., Bromptonville, Que.	Proposed 50,000-tpy deinking plant, with future increase to 150,000 tpy
1990	—	Lake Utopia Paper Ltd., St. George, N.B.	Install 235-tpd Black Clawson secondary fiber system at corrugating medium mill
none	—	Maclaren/Donohue, Montreal, Que.	Proposed joint-venture 85,000-tpy deinked pulp plant
1991	83.0	Newstech Recycling, Coquitlan, B.C.	122,500-tpy market deinked groundwood pulp mill; MacMillan Bloedel and Fletcher Challenge will each purchase half the output
none	100.0	Noranda Forest Inc., Thorold, Ont.	Studying new 272-tpd deinking plant to boost secondary fiber use
none	—	Orford Recycling, Drummondville, Que.	Proposed 120,000-tpy market deinked pulp mill
1991	45.0	Perkins Papers Ltd., Candiac, Que.	Tissue expansion with new paper machine and deinking line
1990	31.0	Scott Paper Ltd., Crabtree, Que.	Build new 65-tpd secondary fiber line; boosts recycled fiber capacity to 165 tpd
none	—	F.F. Soucy Inc. of Associes, Riviere-du-Loup, Que.	Install deinking facilities once a pattern of recycling laws and market needs is established
1991	—	Stone-Consolidated, Shawinigan, Que.	Install capacity for recycled newsprint by end of 1991

and Smurfit Newsprint Corp., northeastern U.S.

RECYCLED NEWSPRINT. While virgin newsprint is suffering the effects of overcapacity, there could be a shortage of recycled newsprint over the next few years. Virtually all North American newsprint producers that are not using any secondary fiber currently are seriously considering some type of expansion into recycled news-

TABLE 1: **Wastepaper processing projects at U.S. mills.**

Start date	Cost ($ million)	Company, mill site	Additional Information
U.S. (US$; short tons)			
1991	55.6	Alabama River Pulp Co., Claiborne, Ala.	Install 110,000-tpy deinking plant to allow new mill to produce 40% recycled-content newsprint
1990	27.0	Augusta Newsprint Co., Augusta, Ga.	Replace stone groundwood pulp mill with new 250-metric-tpd deinking plant to process ONP and magazines
none	—	Bear Island Paper Co., Ashland, Va.	Install deinking for recycled newsprint; timing depends on state recycling laws and markets
none	60.0	Boise Cascade Corp., West Tacoma, Wash.	Looking for joint-venture partner to install deinking plant and convert mill to 40% recycled-content newsprint
1991	75.0	Bowater Southern, Calhoun, Tenn.	Build new 300-tpd, single-line deinking plant to allow production of 40% recycled-content newsprint
1992	85.0	Champion International., Sheldon, Texas	Build new 145,000-tpy deinking plant to allow production of recycled newsprint
1990	—	Chesapeake, Menasha, Wis.	New deinking line; part of $160-million expansion that includes new tissue machine
none	25.0	Daishowa America Co. Ltd., Port Angeles, Wash.	Considering 170-tpd deinking plant to process wastepaper for directory paper production
1992	200.0	Daishowa, Stockton, Calif.	New 350,000-tpy recycled containerboard mill; joint venture with Trans-Rim Enterprises
none	200.0	Dunkirk Containerbd., Dunkirk, N.Y.	Proposed new 250,000-tpy recycled containerboard mill
1991	125.0	Fort Howard Corp., Rincon, Ga.	Fiber processing expansion for fourth recycled tissue machine
1991	25.0	Fox River Fiber, Kaukauna, Wis.	Build new flotation deinking plant to produce 200 tpd of market recycled fiber
none	20.0	FSC Paper Co., Alsip, Ill.	Supplement washing system at recycled newsprint mill with flotation
1990	25.0	Georgia-Pacific Corp., Cedar Springs, Ga.	Linerboard expansion includes 15,000-tpy boost in recycled fiber usage
none	—	Georgia-Pacific Corp., East Millinocket, Maine	Seeking permits for deinking plant to produce recycled newsprint
1990	—	Gaylord Container Corp., Bogalusa, La.	Install 300-tpd double kraft liner recycling system from Black Clawson
none	—	Golden State, Pomona, Calif.	Studying addition of a new recycled newsprint machine, which would require additional deinking capacity
1990	—	Green Bay Packaging Inc., Morrilton, Ark.	Upgrade secondary fiber system for 350-tpd kraft linerboard expansion
none	—	Howard Paper Mills Inc., Urbana, Ohio	Exploring installation of deinking capacity, perhaps in a joint venture
1991	—	Inland Empire Paper Co., Millwood, Wash.	Install 108-tpd washing deinking system to allow production of 40% recycled-content newsprint
none	—	James River Corp., Green Bay, Wis.	Considering phaseout of sulfite mill and expansion of deinking capacity
1992	65.0	James River Corp., Helsey, Ore.	Build new 300-tpd secondary fiber plant to supply tissue and communication paper mills in Halsey, Clatskanie, Ore., and Camas, Wash.
none	—	Kimberly-Clark Corp., Coosa Pines, Ala.	Reportedly considering installation of deinking plant at newsprint mill
1991	—	MacMillan Bloedel Inc., Pine Hill, Ala.	$66-million containerboard mill uprade includes recycled fiber expansion
1990	—	Manistique Papers Inc., Manistique, Mich.	Install a second Voith deinking line to remove hotmelt glue from magazines
1990	—	Mead Coated Board Inc., Mahrt, Ala.	Recycled fiber system from Beloit Jones for new 366,000-tpy paperboard mill
1991	35.0	Menasha Corp., Otsego, Mich.	Corrugating medium expansion; includes new wastepaper processing system to expand secondary fiber usage
1990	66.0	Mi Ho Paper, St. Joseph, Mo.	New fine paper mill; furnish will be market pulp and recycled fiber
1991	—	North Pacific Paper Corp., Longview, Wash	New 165,000- to 180,000-tpy deinking plant to allow production of recycled newsprint
none	480.0	Northampton Pbd, Northampton, Pa.	Proposed 300,000-tpy recycled paperboard mill
1991	15.0	Patriot Paper, Hyde Park, Mass.	Restart idle white paper mill and rebuild deinking plant
none	200.0	Scott Paper Co., Indiana or Kentucky	Build new tissue mill, possibly with deinking capacity
none	—	Smurfit, Fernandina Beach, Fla.	Expand secondary fiber facilities for recycled containerboard machine restart; 1992 target
1990	—	Smurfit Newsprint Corp., Newberg, Ore.	Install flotation deinking to process magazine stock for newsprint furnish
none	—	Smurfit Newsprint Corp., northeast U.S.	New 255,000-metric-tpy recycled newsprint mill
1992	100.0	Stone Container Corp., Jacksonville, Fla.	Convert mill from kraft paper and linerboard to 100% recycled linerboard
1990	16.0	Stone Container Corp., Missoula, Mont.	Build new 144,000-tpy OCC processing plant to supply 20% to 25% of mill's fiber supply
1991	—	Stone Container Corp., Port Wentworth, Ga.	New Black Clawson secondary fiber system for $335-million mill modernization
1993	160.0	Temple-Inland Inc., Mayfield, Ky.	Probable site for new 600-tpd recycled containerboard mill
1990	35.0	Temple-Inland Inc., Newport, Ind.	Recycled medium expansion includes wastepaper plant upgrade
1991	30.0	Weston Paper & Manufacturing Co., Terre Haute, Ind.	Corrugating medium expansion includes OCC upgrade
none	19.0	Weyerhaeuser Paper Co., Springfield, Ore.	Proposed 400-tpd OCC processing system for linerboard mill; 1992 target

print—including those that are far away from wastepaper sources, such as Georgia-Pacific Corp.'s East Millinocket, Maine, mill. Canadian producers are in a particularly tight spot because they are building most of the virgin-pulp newsprint capacity in the current expansion boom, and they are poorly situated geographically to increase usage of recycled fiber because of their distance from metropolitan areas.

Southeast Paper's new 210,000-tpy recycled newsprint machine, started up in 1989, is the sole new newsprint machine among the current crop of expansions to produce recycled grades. Media General Inc.'s Garden State Paper Co. was considering a greenfield mill for the U.S. Northeast, where the landfill problem is most acute, but the project has been thrown into limbo by Media General's announcement that it will sell Garden State. Smurfit Newsprint has approved plans to build a new 255,000-metric-tpy recycled newsprint mill in the Northeast, but the company has not yet announced the location. New recycled paperboard mills have been proposed for the Northeast by Dunkirk Containerboard in New York and Northampton Paperboard in Pennsylvania.

On the West Coast, North Pacific Paper Corp. has approved a plan to install a new newsprint machine at Longview, Wash., that includes a deinking facility capable of supplying 25% of overall mill needs. Golden State Paper, which belonged to Garden State Paper until early 1989 and was recently sold to Jefferson Smurfit, is studying a new recycled newsprint machine for its Pomona, Calif., mill. Also in California, Daishowa and Trans-Rim Ltd. of Seattle have announced plans to build a recycled containerboard mill in Stockton with capacity for 350,000 tpy.

In eastern Canada, Abitibi-Price Inc., Boise Cascade Corp., Bowater, and Stone-Consolidated have all stated publicly that they are studying plans to incorporate secondary fiber in their newsprint operations. Donohue Inc. and James Maclaren Industries Inc. have proposed a joint-venture facility for Montreal, Que. Cascades Inc., Noranda Forest Inc., and Kruger Inc. are also considering deinking expansions. Atlantic Packaging will complete a new recycled newsprint and tissue mill this year in Whitby, Ont., and Daishowa Canada announced this summer that it will install a large deinking plant for recycled newsprint and directory paper production at its Quebec City, Que., mill. In western Canada, Fletcher Challenge Canada Ltd. and MacMillan Bloedel have agreed to take the output of a new market-deinked pulp plant to be built by Newstech Recycling Inc. in Coquitlam, B.C. There are currently no deinking facilities in western Canada. ■

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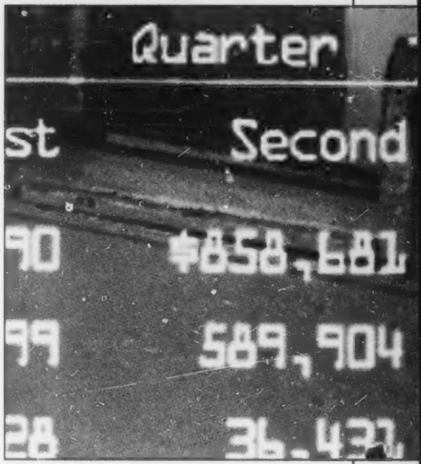


Grade-by-grade cost analysis shows various advantages, but savings depend on geographics, fiber availability, and desired product quality

By ARTHUR C. VEVERKA

Worldwide, nearly 75 million tons of recycled fiber were consumed by the paper industry in 1988, accounting for almost one-third of the total papermaking fiber needs of the industry. North America and Western Europe (as a whole) each consumed some 20 million tons of wastepaper in 1988, followed by Japan with a consumption of 12.5 million tons. These three regions accounted for about 70% of the total worldwide use of recycled fiber.

During the period 1970 to 1988, the demand for recycled fiber grew twice as fast as the demand for virgin pulp on a worldwide basis (Figure 1). This growth amounted to 5%/year for recycled fiber vs 2.5%/year for virgin fiber. It appears the use of recycled fiber will continue to grow even more rapidly in the future.

By 1996, consumption of wastepaper is expected to have passed the 100-million-ton mark and to reach 130 million tons by 2001. With the assumption of an average growth rate of 2.6%/year in global consumption and production of paper and board products, the worldwide recycled fiber utilization rate is expected to increase from 32.8% in 1988 to 41% in 2001.

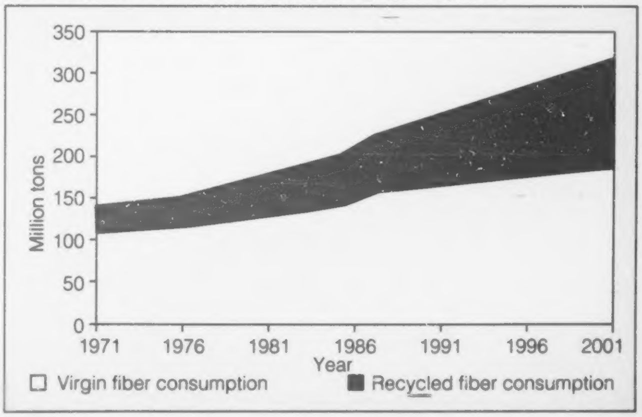
Current demand, however, has not been even across all countries. In Western Europe, the use of recycled fiber has grown nearly four times as fast as the demand for virgin fiber. By contrast, North American recycled fiber use has grown at only 3.4%/year, or slightly more than the increase in virgin fiber use for the same period. Clearly this would seem to indicate a significant potential to use more recycled fiber in North America.

By grade, the packaging board industry, particularly linerboard and fluting producers, has been and will continue to be the main user of recycled fiber. However, on a percentage basis, the most remarkable increases are expected in newsprint, printing and writing paper, and tissue products.

Growth in the importance of deinking grades will be one of the key trends in the wastepaper business. Currently, some 11 million tons, or approximately 14% of the recycled fiber used, are deinking grades. Approximately half of this is used for newsprint, with another quarter going to tissue products. Thus, the great bulk of wastepaper—64 million tons, or close to 85% of the total—is used without deinking, mainly in packaging grades. By 2001, the deinking grades are expected to have increased to about 31 million tons, or 24% of the total consumption of recycled fiber. In a strengthening of the past usage pattern, more than half of the deinked pulp will be used for newsprint.

A major improvement in the recovery rates of wastepaper will be necessary to meet the forecast demands for secondary fiber. An increase is expected in the recovery rates in virtually every area of the world (Table 1). The increases in Western and Eastern Europe will be particularly noteworthy. However, it is in North America, and particularly in the U.S., where the most dramatic

FIGURE 1: **Recycled fiber demand worldwide grew almost twice as fast as virgin fiber demand from 1971 to 1988, and that margin is expected to widen even more, doubling again by 2001.**



Mr. Veverka is president and CEO of Jaakko Pöyry Consulting Inc., Briarcliff Manor, N.Y. All figures, data, and results cited in this article are based on the multi-client study recently completed by Jaakko Pöyry Oy.

increases in wastepaper recovery will take place. In the case of the U.S., the recovery rate is forecast to go from 30.2% in 1988 to more than 44% just after 2000.

Recovery rates, however, are only part of the equation. Some areas of the world not only will use all of the wastepaper they recover but also must import secondary fiber to satisfy their total needs for raw materials. When considering the trade flows of recycled fiber, wastepaper utilization rates achieved by these areas of the world must be analyzed and compared with recovery rates.

Table 2 shows expected utilization rates. Countries where recovery rates (from Table 1) exceed utilization rates are net exporters of fiber. Countries with recovery below the utilization rates are net importers. Thus, Japan, with a recovery rate of 48% in 1988 and a utilization rate near 51%, is a net importer. North America is by far the largest source of wastepaper exports in the world, with an export surplus of 4.6 million tons in 1988, expected to increase to 10.8 million tons by 2001.

Wastepaper trade flows throughout the world show the importance of the U.S. as a major exporter of secondary fiber. The U.S. sends 3.18 million tons of wastepaper to Pacific Rim countries and 1.12 million tons to Central America. The recovery of wastepaper and board in North America is forecast to expand and continue to outstrip demand, allowing for a growing export surplus. A recovery rate increase from 29.4% to 42.9% for North America as a whole (Table 1), combined with a utilization rate increase of about 8.5% for the forecast period (22.8% to 31.3% in Table 2), allows for a doubling of offshore exports by 2001. The U.S. will be the most dominant source for all wastepaper, exporting between 4 million and 5 million tons to Canada, in addition to more than 10 million tons to offshore users.

TABLE 1: **To meet increasing demand for secondary fiber, wastepaper recovery rates are expected to increase in almost every area of the world, with North America experiencing the greatest percentage increase (13.5%) by 2001.**

Region	**1988**		**2001**
		%	
North America	29.4		42.9
U.S.	30.2		44.4
Western Europe	35.8		41.5
E.F.T.A. countries	40.9		47.8
European Community	35.1		40.7
Eastern Europe and U.S.S.R	29.0		38.7
Oceania	24.8		31.3
Latin America	33.6		36.8
Japan	48.0		52.0
China	20.4		24.5
Rest of Asia	34.2		40.9
Africa	16.5		19.0
World total	**32.7**		**41.0**

NEW DRIVING FORCES. The key driving force for the use of wastepaper has traditionally been economics. Wastepaper enabled mills and countries without abundant forest resources to compete effectively on bulk grades with integrated producers using virgin fiber. This was the case in large paper- and board-consuming regions, such as Japan and Western Europe, where it has been relatively easy to collect and process large volumes of wastepaper. In the Far East, it is doubtful if local industries could have progressed without the cost economies of wastepaper. In North America, on the other hand, abundant forest resources have not historically encouraged the use of recycled fiber.

Technology has also played a role in the traditional use of recycled fiber. Improved technologies in the fields of cleaning, deinking, and handling of wastepaper have allowed production of acceptable end products using secondary fiber as the raw material source.

This situation is now changing. There are new forces scarcely mentioned in previous times—problems associated with disposal of solid waste and the environmental factor. The paper industry is now being told to use wastepaper not because it is good for the paper industry but rather because it is good for the environment. The introduction of these considerations into the industry's thinking and growing reinforcement by mandatory legislative measures are creating strong pressures to recover and recycle more wastepaper in North America.

Despite the emergence of environmental forces for the use of wastepaper, economic reasons will continue to be important and, in many respects, a necessary ingredient for promoting recycled fiber use in the paper and board industry. Furthermore, technical developments in recycled fiber handling, such as fiber fractionation, bleaching, in addition to the other separate handling techniques, will, in the long-term, bring

TABLE 2: **A comparison of recovery rates (Table 1) with utilization rates shows North America could possibly double wastepaper exports by 2001.**

	Total paper and board production		**Wastepaper consumption**		**Wastepaper utilization (%)**	
	1988	**2001**	**1988**	**2001**	**1988**	**2001**
North America	86,737	115,198	19,778	36,030	22.8	31.3
Western Europe	57,633	78,844	19,811	31,228	34.4	39.6
E.F.T.A. countries	22,350	30,400	2,967	5,198	13.3	17.1
European Community	35,283	48,444	16,844	26,031	47.7	53.7
Eastern Europe	17,988	22,193	4,868	8,746	27.1	39.4
Oceania	2,487	3,864	702	1,271	28.2	32.9
Latin America	10,506	15,909	4,757	7,801	45.3	49.0
Japan	24,624	34,892	12,538	19,415	50.9	55.6
China	12,645	19,760	3,084	8,305	24.4	42.0
Rest of Asia	12,218	22,431	8,369	15,877	68.5	70.8
Africa	2,524	679	679	1,092	26.9	30.5
World total	**227,362**	**316,669**	**74,586**	**129,766**	**32.8**	**41.0**

additional economically feasible solutions to increased secondary fiber use.

COST COMPETITIVENESS. With these varied forces in mind, a change exists in the current economic situation for use of recycled vs virgin fiber for five specific grades—newsprint, printing and writing paper, tissue, linerboard, and corrugating medium. For comparison purposes, cost estimates were prepared for the production of the five products for various locations worldwide using both recycled and virgin fiber.

The basis for the cost estimates is a computerized cost-estimating model developed by Jaakko Pöyry. This model uses technical and economic mill data within a simulation framework and is typically used to examine the relative differences in production costs between existing pulp and paper mills. However, for this study, hypothetical new greenfield mills were simulated rather than using existing ones. This was done to present a more generic picture and to make the results as uniformly applicable as possible.

The new mills represent the most modern technology in typical mill/machine sizes for each of the paper and board grades examined. For technical and wastepaper procurement reasons, the average size of a mill using recycled fiber as the main raw material may be smaller than that of a virgin fiber-based mill. Costs are calculated for reels only, without regard to possible sheeting or converting operations. Capital costs, which have been included, represent a return on investment of 17%.

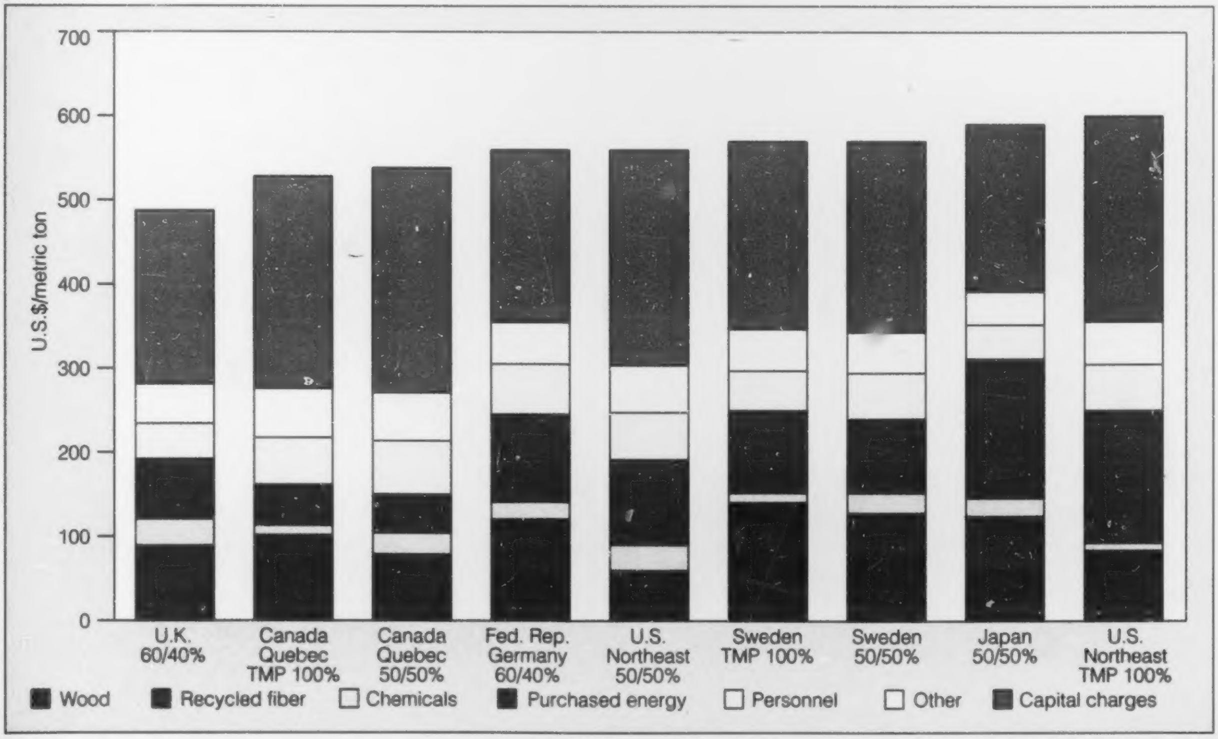
The unit prices and cost of raw materials, chemicals, energy, labor, and other production factors represent regional averages. Recycled fiber prices are average prices of the recycled fiber mix used in each grade. The cost level used for each recycled grade is that of third-quarter 1989. The units are U.S. dollars (US$)/metric ton. In the case of purchased chemical pulp, pulp substitutes, and high-grade deinking waste, long-term trend prices have been used instead of the actual third-quarter 1989 prices to get a more realistic picture of the cost competitiveness between virgin and recycled fiber-based products. Therefore, the price used for northern bleached softwood kraft (NBSK) pulp represents a long-term trend level of $650/metric ton.

For each of the cost-competitive comparisons, the specifications for the grade and mills are presented, followed by the production costs of the grade in question.

NEWSPRINT. Capacity of the simulated newsprint mill is the same for both recycled fiber or virgin fiber mills, at 220,000 metric tpy (Figure 2). The finished product is standard newsprint at a basis weight of 45 g/m². The furnish ranges from 100% thermomechanical pulp (TMP) to 100% deinked recycled fiber.

The recycled fiber component for newsprint was a mixture of highest-quality old newspapers (ONP) and sorted newspaper and magazine waste collected from households. Typically this mixed newspaper and magazine waste contains approximately 70% ONP and 30% magazines, pamphlets, inserts, and other advertising

FIGURE 2: **Production costs for new 220,000-metric-tpy newsprint mills, in selected areas and with typical fiber furnishes, show that recycled fiber use can be a competitive alternative to a 100% virgin fiber mill, especially in the northeastern U.S., where savings could be $110/ton.**



materials. The yield when processing the furnish into deinked pulp was assumed to be 86%.

Production cost estimates of new newsprint mills in selected regions, with typical fiber furnishes for the region, are shown in Figure 2. The most competitive regions are the U.K. and Quebec. In Canada, there is no advantage from use of a partial-recycled furnish because of the low wood cost and, in particular, the low power prices. In Sweden, a 100% TMP-based newsprint mill would be as competitive as a 50% recycled fiber-based operation since the high price of recycled fiber (approximately three times the northeastern U.S. price) and the somewhat higher personnel and capital requirements associated with two fiber lines effectively counterbalance the savings in wood and energy costs.

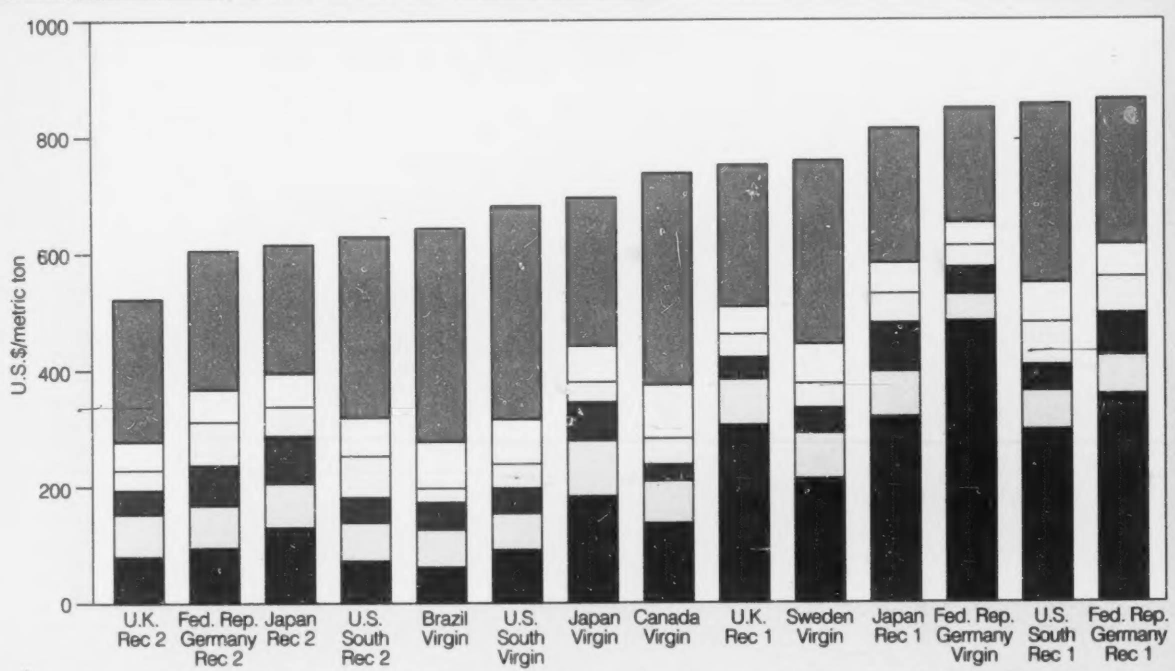
In general, the same problem of having two relatively small fiber lines instead of one line of economical size affects all 50:50 concept mills. Adding a second paper machine at the mill site would improve, to a considerable extent, the total mill economy of using a 50% recycled fiber furnish. Nevertheless, the savings in a northeastern U.S. mill (at a 50% recycled fiber content) are close to $50/ton.

Production of newsprint with a 100% recycled furnish would, however, look attractive in all regions studied. Savings in production costs range from $25/ton in Sweden to $110/ton in the northeastern U.S. It should be remembered that production of 100% recycled fiber-based newsprint requires procuring a very clean, homogeneous, and virgin fiber-containing newsprint stock on a continuous basis. With higher rates of utilization being forecast throughout the world, this may become increasingly difficult to do and could, in the long term, put a limit on the amount of recycled fiber used in a typical newsprint furnish.

PRINTING AND WRITING PAPER. For printing and writing grades, the production cost estimates were calculated assuming the finished product is a typical printing paper used by offices, namely an uncoated offset paper suitable for copy paper or computer printouts. Basis weights of these grades would typically be in the 60 to 80 g/m² range. For this grade, the capacities of the virgin fiber and recycled fiber-based mills would be considerably different. Capacity of the virgin fiber mill was taken to be 280,000 metric tpy, while the recycled fiber mill, due to the considerations originally mentioned, would typically be in the range of 150,000 metric tpy (Figure 3). The other major difference with this grade was the brightness, with the virgin fiber product being the brighter of the two (86% ISO vs 80% ISO).

An additional variable in the equation is that two types of recycled fiber were considered. The first was white ledger computer printouts and other printed wood-free waste. In the second case, a 50:50 mixture of magazines and ONP was used. The assumed deinked pulp yields varied between 86% and ~~82%. In~~ addition to all of the above, the virgin fiber-based mill (except for Fed. Rep. Germany) was assumed to be integrated with a 400,000-metric-tpy kraft pulp mill.

FIGURE 3: **Comparison of production costs for a 280,000-metric-tpy virgin fiber mill and a 150,000-metric-tpy recycled mill show a mixed competitive picture. Mills using higher-grade wastes (Rec 1) generally have slightly higher costs than virgin fiber mills. However, if lower-quality waste can be used, secondary fiber can provide cost savings.**



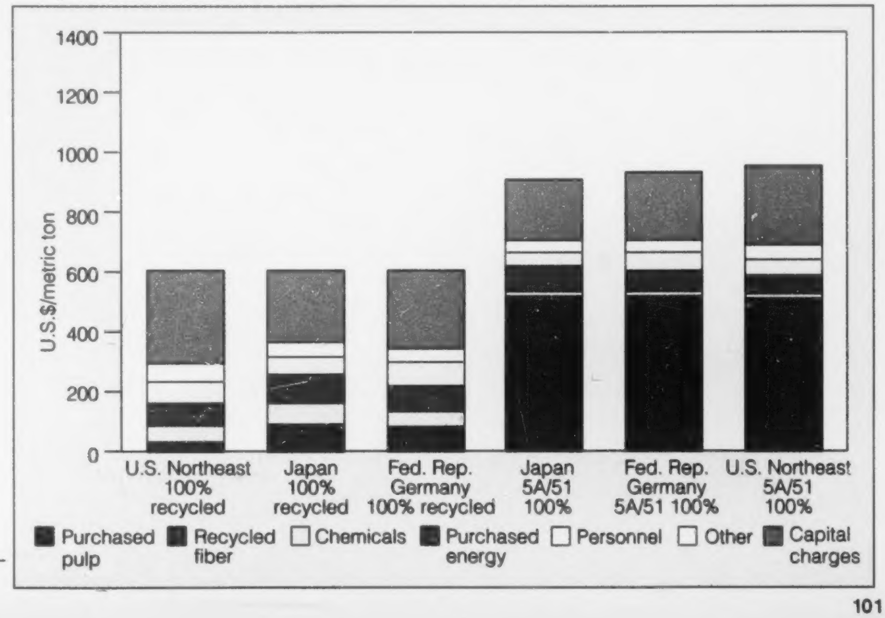
The uncoated wood-free product presents a somewhat mixed cost-competitive picture (Figure 3). A printing paper mill using pulp substitutes and high-grade deinked wastepaper has no advantage in total raw material and energy costs compared with an integrated kraft mill. Actually, the raw material and energy costs for a southern U.S. mill are less than half those of a high-grade recycled paper mill. For total production costs (including capital costs), the virgin fiber-based mill has a cost advantage over a high-grade wood-free waste-based mill, amounting to some $170/ton in the southern U.S. and almost $115/ton in Japan. In Fed. Rep. Germany, the production costs of a nonintegrated virgin fiber-based mill and a recycled mill using high-grade waste are approximately at the same level.

If allowance is made for a lower product quality (including brightness), considerable cost savings can be achieved in all regions, if the lesser-quality recycled fiber furnish (blend 2) is used. Total production cost savings range from $235/ton in the case of the nonintegrated virgin fiber mills in Fed. Rep. Germany to about $70/ton in Japan and $55/ton in the southern U.S. (comparison is to integrated virgin fiber mills).

The lower-quality printing paper seems interesting in areas where the competitors are unintegrated producers—for example, the U.K. and Fed. Rep. Germany. However, it is, quality-wise, a totally different product. When using lower-quality raw material, the resulting product quality difference is reflected in the price structure of the products. This can clearly be seen in the price of recycled fiber-based continuous stationery, which is priced up to 30% to 40% lower than the virgin wood-free continuous stationery.

In most cases, the main advantage of the use of lower-quality waste has been the ability to offer the buyers a differentiated and less-expensive product, often with a clear gray shade for color. In addition, this has often been the only possibility for small unintegrated mills to continue operation since they are not competitive with the production of virgin fiber-based products.

FIGURE 4: **Production comparison costs for a 70,000-metric-tpy tissue mill producing jumbo rolls show considerable savings are possible using secondary fiber—up to $400/ton when pure virgin fiber production is compared with pure recycled fiber production.**



TISSUE. For tissue production, a 70,000-metric-tpy machine was chosen as the representative mill size for both the recycled and virgin fiber-based products (Figure 4). The additional assumptions are that the virgin fiber mill would not be integrated with a chemical pulp mill and also that the purchased hardwood/purchased softwood mixture would be roughly 50:50.

The deinked pulp for the recycled fiber-based mill was based on a newspaper and magazine mix. While this may be typical for a European or Japanese mill, it is not necessarily a recycled fiber furnish favored by U.S. mills, where there is a tendency to use a somewhat higher grade of recycled fiber because of consumer desire for a higher-quality end product. The deinked pulp yield for the mixed newspaper/magazine input was assumed to be 80%.

The product specifications chosen were that of a toweling grade produced in jumbo rolls. The cost of any conversion of the jumbo rolls to consumer-size rolls was not figured in.

A considerable cost savings is attainable due to the use of recycled fiber in this grade (Figure 4). The savings in raw material and energy costs are approximately $500/ton and total productions costs between $350 and $400/ton when pure virgin fiber and pure recycled-based products are compared. Although not shown on the diagram, estimates show that production based on the use of a 50:50 recycled fiber/virgin fiber mix would result in a savings of about $200/ton in total production costs.

Obviously, the cost comparisons can be affected greatly by the use of a higher-quality recycled fiber to improve end product quality or by the use of bleached chemi-thermomechanical pulp (BCTMP) in the place of chemical pulp. Nevertheless, the recycled fiber product consistently shows a production cost advantage over a virgin fiber-based tissue product.

It should be noted that despite lower production costs associated with the recycled product, this cannot automatically be translated to increased profit since prices of the finished product react substantially to quality levels. However, to date, the price differential between recycled fiber-based and virgin fiber-based jumbo reels has been somewhat smaller than the 35% difference in the production costs shown. Typically, this has been in the 15% to 25% range in Western Europe. Through environmental concern and product branding, it has been possible in many cases to set the prices of recycled fiber-based end products even nearer those of virgin fiber-based products. In some cases, the differential has been reduced to the 10% to 15% range.

LINERBOARD. For comparison of linerboard costs, the mill models differed in size between the virgin (kraft liner mills) and the recycled (test liner mills) (Figure 5). The typical kraft liner mill capacity was assumed to be 400,000 metric tpy, while the test liner facility was based on a 250,000-metric-tpy capacity. In both cases, production costs were calculated for a 150 g/m² product.

In principle, no technical reason exists for the recycled linerboard machine to be smaller than the kraft liner machine. In practice, however, recycled liner machines tend to be smaller for raw material procurement reasons, and the 250,000-metric-tpy machine size chosen is actually very large in comparison with existing test liner machines.

Two furnishes for kraft liner were investigated: a 100% unbleached kraft pulp and a mix of 80% unbleached kraft pulp and 20% old corrugated containers (OCC). Integration with an unbleached chemical pulp mill is assumed. For the test liner mill, the furnish chosen was 90% OCC and 10% double lined kraft (DLK) clippings. The average yield when processing corrugated waste to cleaned recycled pulp is assumed to be 92%.

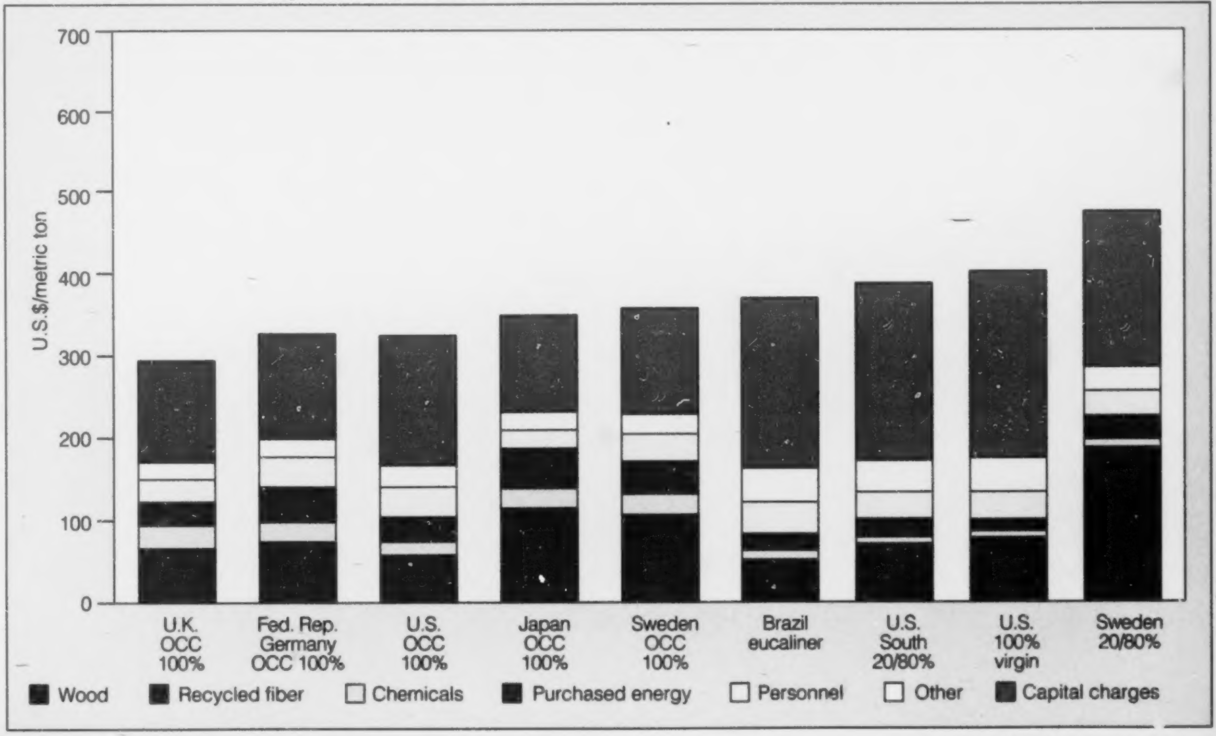
The cost comparative data in Figure 5 clearly show that the attainable savings in raw material and energy costs will vary with the recycled fiber content. In a case of 100% recycled linerboard, the energy costs are clearly higher because no energy-generating pulp mill is nearby. The chemical costs are likewise higher because of the surface sizing requirement of test liner.

In areas with high wood costs, such as Sweden, a test liner mill can have $75 to $80/ton savings in total raw material and energy costs over a kraft liner mill. However, in the southern U.S., where wood costs are low, only a minor advantage can be achieved with an increasing use of recycled fiber ($4/ton when using OCC and $5/ton when 100% OCC/DLK is used).

When total production costs are examined, the capital intensity of the virgin fiber mill, with its integrated pulp mill, clearly translates into a higher capital cost. Among virgin fiber-based producers, the southern U.S. and Brazilian (eucaliner) producers have a clear advantage. All the recycled fiber-based producers however, are competitive in their own local markets, including Japan.

According to calculations, in a new mill the production costs of test liner are about 13% to 27% lower than those of kraft liner in Western Europe. This also corresponds roughly to the price difference. In the southern U.S., the total cost difference is smaller due to lower wood costs and amounts to only about 15% to 20%.

FIGURE 5: **Comparison of production costs for a 400,000-metric-tpy kraft linerboard mill with a 250,000-metric-tpy test linerboard mill shows that the major cost difference is in capital costs for a virgin fiber mill (due to an integrated pulp mill) and raw materials and chemical costs for the 100% recycled mills (due to lower wood costs in various regions).**



CORRUGATING MEDIUM. For production of corrugating medium (fluting), the choice between virgin and recycled fiber is not a very important consideration in most areas of the world, except in the U.S., since this grade is already predominantly based on the use of recycled fiber. The typical mill size studied, at 250,000 metric tpy, was the same regardless of the fiber input (Figure 6). The basis weight of the product chosen for comparison was 150 g/m². In the case of the virgin fiber product, the furnish was assumed to be 100% NSSC pulp. For the recycled mill, the furnish was assumed to be 75% OCC and 25% mixed waste. Fiber yield on this furnish was assumed at 92%.

In fluting, the NSSC-based product can, in the southern U.S., reach similar or even slightly lower manufacturing costs than a waste-based product (Figure 6). However, this is possible only in the U.S., where wood prices are low. When considering the heavy capital cost of a new NSSC pulp mill, the cost comparison changes in favor of the recycled fiber-based product in the southern U.S. This advantage is approximately \$50/ton. A northern U.S. location would be even more favorable for recycled fluting.

Given the relatively modest differences in production costs of recycled-based corrugated medium in various regions of the world, it is easy to understand why there is a relatively limited international trade in this product.

IMPLICATIONS TO BUSINESS. This cost-competitive analysis focused on the differences between new greenfield recycled fiber mills vs virgin fiber facilities. When considering the total spectrum of cost competitiveness, several other scenarios have to be considered:

- The cost implications of replacing an aging kraft mill at an integrated facility with a secondary fiber processing plant
- The potential of gaining incremental papermaking capacity and satisfying that increment with the use of recycled fiber.

Each of these alternatives would, given the proper circumstances, probably be very cost-competitive and cost-effective uses for recycled fiber. On the other hand, some conclusions relative to cost competitiveness and its impact on the increased use of recycled fiber can be made from the comparative study.

In newsprint production, using recycled fiber currently yields a definite cost advantage. In North America, this will probably mean that, in the long run, there will be a transition of newsprint production from areas having abundant wood resources toward areas having abundant recycled fiber resources.

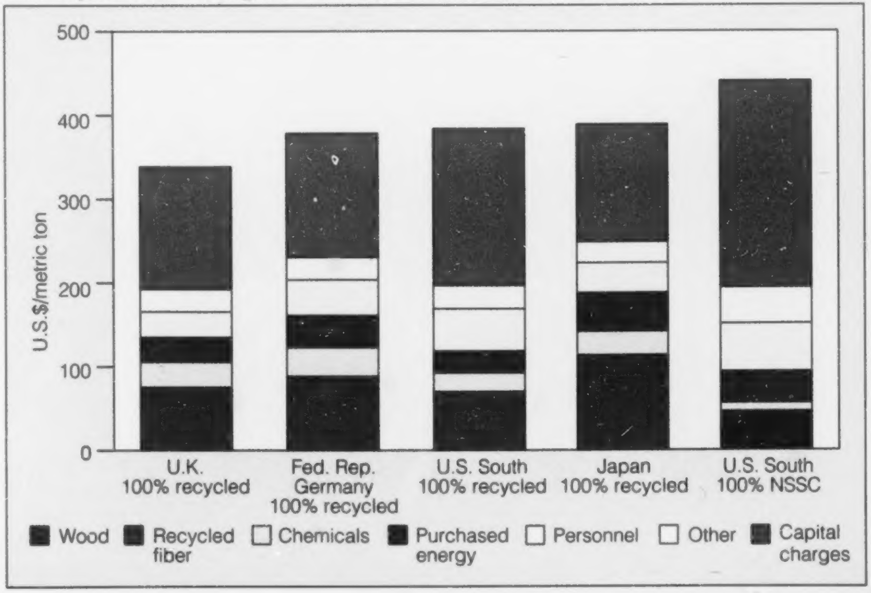
In printing and writing grades, there would appear to be minimal economic incentive for including recycled fiber in finished products. However, it is likely that recycled fiber-based products will be produced and sold, not because of any potential economic advantage but because of a public concern for the environment and a desire to purchase "environmentally friendly" products.

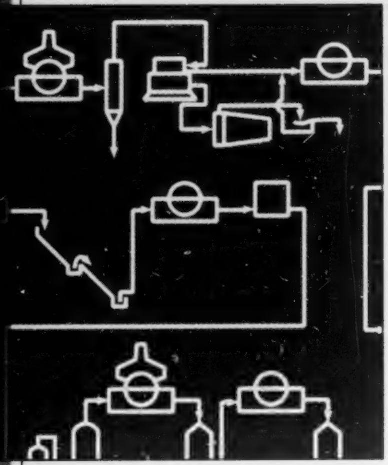
For tissue products, recycled fiber use can definitely lower the cost of production, but some quality differences exist in the products. Current indicators show that consumers in North America will be willing to accept slightly lower product quality and, hence, will favor recycled tissue products over virgin fiber-based products.

Linerboard production in the U.S. currently already contains, for the most part, a substantial recycled fiber quantity (20% OCC). The economics, though, would indicate that there is a potential for increasing the amount of recycled fiber used by existing mills and that there is also the possibility for producing an economically viable test liner mill. Despite apparent cost advantages, the increased use of recycled fiber in linerboard will probably depend on changes in applicable shipping rules, e.g., Rule 41.

For most of the world, no competitive activity exists between recycled fiber-based and virgin fiber-based corrugating medium. The clear economic advantage is toward the waste-based product. In North America, it is probably fair to say that the future should favor the introduction of more recycled fiber medium. However, in areas with low hardwood costs, NSSC medium can still be a very cost-competitive product. ■

FIGURE 6: **Production costs for a new 250,000-metric-tpy corrugating medium mill show that recycled fiber mills clearly have an advantage over a virgin-based NSSC mill, which mirrors the fact that production of this grade is already based on recycled fiber use.**





Proper Deinking Chemistry, Bleaching Technique Crucial to Pulp Brightness

Bleaching trials of deinked groundwood grades show that understanding residual ink's impact on brightness will help improve pulp quality

By MICHAEL DODSON and LOWELL DEAN

The U.S. paper industry has historically recycled about one-fourth of its total production, except during World War II. This rate is approximately half that of countries with limited natural resources, such as Great Britain, Holland, or Japan. The U.S. recycling rate peaked during the war years at 35% due to the need for conservation of raw materials. After the war, legislation was passed to stimulate the development of natural resources, which gave the production of finished goods from virgin materials a distinct economic advantage.

Although newspaper was recycled during the war, afterwards, until the mid-1970s, recycling back into newsprint was practiced by only one corporation, Garden State Paper. In the mid-70s, three mills in the U.S. began recycling newspaper because of wood supply limitations. Before that, most deinking was conducted with wood-free wastepaper, mainly for tissue production and to a lesser degree printing and writing paper.

Wood-free grades have become less available, forcing major wastepaper consumers to evaluate groundwood wastepaper grades. Also, over the next decade more high-quality mechanical fiber will be used in traditional wood-free grades, with the increased acceptance of bleached chemi-thermomechanical pulp (BCTMP). As the use of groundwood grades increases, so will the need for upgrading quality through bleaching technology.

Why should there be an interest in recycling groundwood grades? Table 1 lists the U.S. production of all grades of paper and paperboard. As the table shows, groundwood grades (newsprint, uncoated groundwood, coated groundwood) account for a significant portion of total paper production. In fact, the 11.7 million tons account for 31% of 1989's paper production and, if tissue is excluded (much being unrecyclable), these grades account for 36% of the total. When Canadian production is included, more than 20 million tpy could potentially be recycled in North America.

WASTEPAPER QUALITY. A readily available supply of wastepaper is not enough. The resulting pulp must have adequate quality for its final end use at competitive manufacturing costs. The key pulp quality issues are strength at a reasonable drainage rate and good optical properties (brightness, opacity, and cleanliness). This article deals with the brightness quality spectrum that can be expected from peroxide and hydrosulfite bleaching of deinked groundwood content pulps.

Various key factors determine the brightness of deinked pulp. They include the following:

- Type of wastepaper
- Pulping/deinking chemistry
- Efficiency of ink removal by washing or flotation equipment
- Amount and efficiency of water clarification
- Bleaching method.

Meeting quality expectations requires good performance in all areas. Furthermore, since many of these factors are interrelated, there may be compromises between them. This places a great importance on field op-

TABLE 1: **Groundwood grades (newsprint, uncoated groundwood, coated groundwood) account for a significant portion of paper production, making those grades major candidates for recycling.**

	1989 annualized[1]
Newsprint	6,088
Uncoated groundwood	1,754
Coated groundwood	3,894
Coated free-sheet[2]	3,300
Uncoated free-sheet	11,043
Other printing/writing	1,494
Packaging and other paper	4,925
Tissue	5,636
Total paper	**38,133**
Total paperboard	**38,492**
Total paper and paperboard	**76,625**

1. American Paper Institute.
2. *Pulp & Paper* estimate.

Mr. Dodson is southeast regional manager, and Mr. Dean is manager-chemical sales, Lion Industries, Vancouver, Wash.

timization of deinking chemistry, water clarification, and bleaching conditions.

The type and quality of the paper furnish is probably the major factor in determining ultimate brightness development of deinked pulps. The proper wastepaper grade should be selected based on the final product with respect to strength and optical property needs. Both the proper grade and the age and homogeneity of the furnish are important.

Lower-quality grades can contaminate wastepaper and must be avoided. Adherence to guidelines such as the paperstock standards and practices of the Paper Stock Institute of America are effective in minimizing contamination. Age of the wastepaper is also important, especially in groundwood grades, which are more susceptible to yellowing from light than wood-free grades. Even short periods (less than six months) of aging can result in the loss of one or two brightness points. Severe aging or yellowing from sunlight will result in even lower brightness and ink removal problems.

In general, newsprint brightness varies depending on the region where it was manufactured. West Coast newsprint produced from darker wood species is normally about 55 brightness, while southern newsprint is approximately 57 and eastern Canadian and northeastern U.S. newsprints are normally 59 and higher. Since newsprint sales tend to be regionalized, it can be anticipated that deinked pulp brightness will be dependent on the region in which the wastepaper is collected.

The majority of coated groundwood paper is No. 5 grade, although there is also production in the higher-quality No. 4 grade. Much of this production has low basis weight and is used in magazines. The basesheet brightness for No. 5 paper is typically 64 to 70 brightness depending on individual mill quality specifications, coating coverage, and coating brightness.

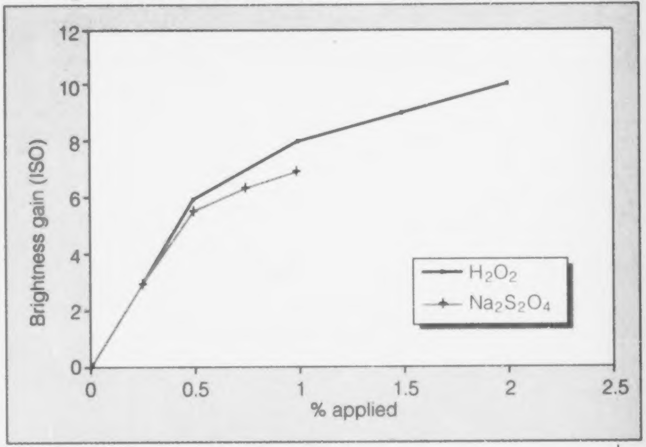
The uncoated groundwood grades have the widest range of brightness levels. Upgraded or specialty newsprint is on the low end of the spectrum at 61 to 65 brightness, while some supercalendered grades can be as high as 74 to 76 brightness. These grades are probably the most difficult to segregate as postconsumer waste since much ends up as inserts in newspapers.

BLEACHING OF DEINKED PULPS. Groundwood deinked and wood-free pulps are bleached by different chemicals. Traditionally, wood-free pulps have been bleached to 76 to 80 with chlorine-based oxidants. Single-stage hypochlorite bleaching is most common. Both CEH and CH bleach sequences are used when wastepaper quality is lower and brightness standards higher.

Delignifying bleaches, such as chlorine or hypochlorite, are not appropriate for groundwood due to the high loss in yield. Traditionally, sodium hydrosulfite and hydrogen peroxide have been used to bleach deinked groundwood pulps.

The following discussion endeavors to define the brightness development of deinked pulps made from 100% newsprint, 60% newsprint/40% coated magazine, and 100% coated magazine. The information on 100% newsprint is a compilation of data accumulated during 16 years of bleaching of commercially generated deinked pulps. This is supplemented by recent work on a commercial pulp made from a 60% newsprint/40% magazine furnish and a lab pulp made by simulating a flotation/washing system from 100% magazine stock.

FIGURE 1: **Good brightness can be obtained through application of peroxide up to 1%. However, increasing the application level further gives only incremental improvement.**



100% NEWSPRINT BLEACHING. Deinked pulps do not respond as well to bleaching as virgin pulps.[1] For instance, in peroxide bleaching of mechanical pulps, six to eight point increases can be expected from 1%, 12 to 15 points from 2%, and 17 to 18 points from 3%. These numbers can be contrasted with the curve in Figure 1. Good response is obtained with up to 1% peroxide applied. However, increasing the application level further gives only incremental improvement.

Residual ink and metal contamination critically affect the response. In fact, some deinked pulps with high metals and residual ink give only limited response—two to four point increases with 1% peroxide. High residual ink and metals can be the result of a system closure that is too tight, especially with respect to fines removal. The metals and ink have a tendency to travel with the fines, so it is important to establish the proper balance between yield and good bleach response in addition to using chelants for metal control.

Interestingly, hydrosulfite bleaching also seems to be affected by residual ink, although to a lesser degree than peroxide bleaching. This effect may be more a masking of residual ink than hydrosulfite decomposition from iron, although the variation in response is not well understood. In mill operations brightness response on 100% newsprint varies from five to eight point increases, with six to seven point increases being normal. When only a six or seven point increase is required, hydrosul-

TABLE 2: **Mechanical pulp in coated groundwood has a higher brightness than in newsprint, resulting in a significantly higher brightness vs 100% newsprint.**

	100% newsprint		60%/40%		100% coated	
	Brightness	Bleach response	Brightness	Bleach response	Brightness	Bleach response
Deinked pulp	47 to 50	—	54 to 56	—	62 to 67	—
Single-stage hydrosulfite[1]	53 to 57	6 to 7	60 to 63	6 to 7	68 to 74	6 to 8
Single-stage peroxide[2]	53 to 58	6 to 8	60 to 64	6 to 8	71 to 77	9 to 10
Two-stage peroxide/hydro[3]	57 to 62	10 to 12	63 to 67	9 to 11	74 to 80	12 to 13

1. 1.0% sodium hydrosulfite applied.
2. 1.0% hydrogen peroxide applied at high consistency.
3. 1.0% hydrogen peroxide/1.0% sodium hydrosulfite applied.

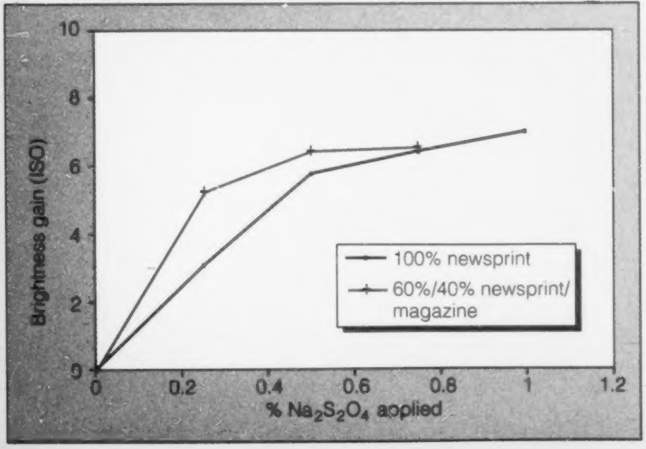
fite bleaching is preferred over peroxide due to its lower chemical and capital costs. Groundwood paper deinking is conducted at low temperatures, 110° F to 120° F. When hydrosulfite bleaching is installed, consideration should be given to heating the pulp to 135° F to 150° F because this should give one point higher brightness than lower temperatures.

For mills that require greater than a 55 to 57 brightness with a 100% newsprint furnish, serious consideration should be given to two-stage bleaching. The peroxide stage can be moderate or high consistency. High-consistency bleaching requires higher capital but has lower chemical costs.

60% NEWSPRINT/40% MAGAZINE BLEACHING. Until a year ago, two Canadian operations were the only mills in North America using a mix of newsprint and coated paper. Currently, there are two in operation in the U.S. and three new systems have been approved. The systems being installed are combination flotation/washing deinking plants. Thus, there is not much information on bleaching response of these pulps in U.S. and Canadian wastepaper furnishes.

Care must be used in drawing direct conclusions from European data. For example, their furnishes include not only newsprint and magazines but also printing and writing paper. There is little segregation of wood-free wastepaper for wood-free deinking as in North America, and this can affect the base brightness and bleachability.

FIGURE 2: **In bleaching of both 100% newsprint and a 60%/40% newsprint/magazine blend with hydrosulfite, similar responses were obtained, except that responses leveled off at lower dosages for the blend.**



As magazine is added to newsprint, pulp characteristics change in three ways. Strength properties increase since coated groundwood has a much higher kraft content. The mechanical pulp in a coated groundwood sheet has a higher brightness—typically 64 to 70—than in a newsprint sheet. This difference results in a significantly higher brightness (six to seven points) vs 100% newsprint (Table 2). Slightly higher brightness can be expected if either high-quality newsprint is used or if the newsprint is sourced from eastern Canada or the northeastern U.S.

As magazine addition is increased, ash content also increases. For good flotation performance, a minimum amount of ash is required. Unfortunately, ash can be detrimental to peroxide bleaching.[2] The ash carries high levels of metals, even to the degree that the effectiveness of a chelating agent can be overwhelmed. Thus, it is important to have adequate washing if peroxide bleaching is a part of the process.

A laboratory study was conducted on pulp produced in a combination deinking system with minimal washing. The ash content was high (about 9%). The purpose of the study was not only to check the response to peroxide bleaching but also to compare Lionsperse 855, a proprietary chelant, with DTPA. This initial study indicates that more severe conditions (longer retention, higher temperature) should be used than when bleaching pulp from 100% newsprint.

Using pulp of 53.6 initial brightness, a five-point increase was obtained with 1% peroxide by bleaching for two hours at 10% consistency. Another half-point increase was obtained using 1.5% peroxide. Improved results were obtained since 30% to 40% residual peroxide remained and high-consistency conditions were not used. Either 0.2% DTPA or Lionsperse 855 as a pretreatment gave similar results. With Lionsperse 855 as the chelant, 58.9 brightness was obtained with a peroxide residual of 32% vs 58.7 and 37% residual with DTPA.

A different sample from the same system was tested for hydrosulfite bleach response. Comparing 60%/40% blend with 100% newsprint produced similar bleach responses, except that the response leveled off at lower dosages for the blend (Figure 2). This difference could be explained by the lower amounts of mechanical fiber available for bleaching reactions in the blend. Single-stage hydrosulfite bleaching gives adequate brightness for standard newsprint and low brightness (low 60s) for specialty grades. For higher-brightness grades, a two-stage bleach plant could be necessary.

100% COATED BLEACHING. Deinking of 100% coated wastepaper has the greatest potential for use in higher-brightness grades of paper, such as coated and uncoated groundwood, as well as tissue. Currently, only two mills in the U.S. use this furnish.

To round out this study, a sample of magazine stock was deinked in the Lion research laboratory. The paper was deinked using flotation followed by two wash stages with a 60 mesh screen. A typical deinking formulation was used with 0.1% Lionsperse 855, 1% sodium silicate, 0.5% H_2O_2, 0.5% Lionsurf FA-709, and 0.5% NaOH.

After deinking, the pulp with 62 brightness was used for subsequent peroxide bleaching. Chelant pretreatment on this pulp did not improve the bleach response, indicating that ash removal was effective with the laboratory washing techniques. However, this indication does not imply that chelants will not be necessary in a commercial installation where higher residual ink and ash levels can be expected than in lab pulps.

Bleaching with 1% peroxide for two hours at 10% consistency gave a 9.5% lift to 71.6 brightness. Using 1.5% peroxide resulted in an additional increase of 0.5 to one point. More severe bleaching conditions should be used on this pulp than on the 60%/40% blend. Even at a bleaching temperature of 150°F (vs 135°F for the 60%/40% blend), there was 46% residual peroxide with 1% applied and in excess of 50% residual with 1.5% applied. Further optimization (including longer retention and higher consistency) should improve the results of this study.

Lionsperse 855 was evaluated to determine the feasibility of reducing costs by partially replacing silicate in the peroxide bleach liquor. With 0.2% chelant, the silicate level could be reduced from 3% to 1% at an equal brightness of 71.6. The residual peroxide level was slightly lower without silicate, 48% vs 44%. At this replacement ratio, savings should be more than $1/ton.

Although hydrosulfite bleaching was not conducted on this sample, previous lab work and mill experiences indicate that a slightly better bleach response can be obtained with coated groundwood. This response may be the result of lower residual ink levels since magazines have a lower ink content initially than newspaper. Also, ink removal from coated paper is easier since the ink is on the coating and has not penetrated into the fiber.

The deinking and bleaching of 100% coated paper produces the highest-brightness pulp. This pulp could be used in higher-quality grades since a properly designed deinking and bleaching system could produce 74 to 80 brightness (Table 2). ■

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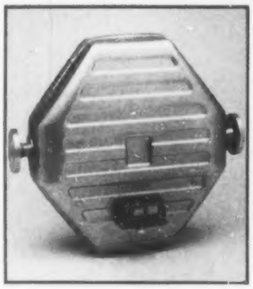

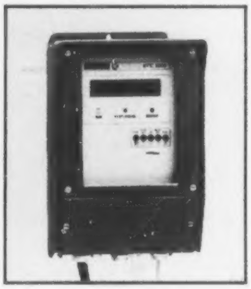

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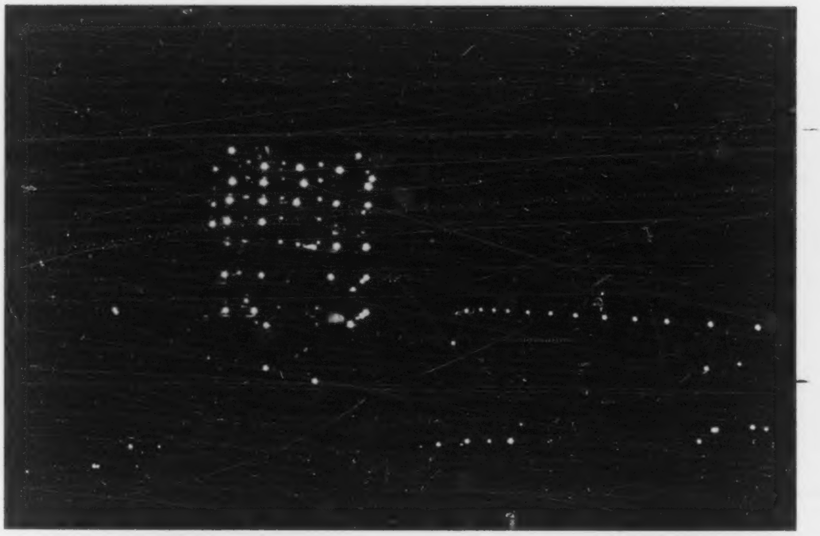
(Pulp mill night photo courtesy of Gaylord Container's Bogalusa, La., mill.)



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Tasman raises newsprint capacity

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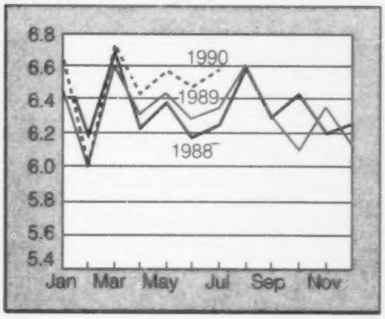
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.6 million tons in July, according to the American Paper Institute, an increase of 4.0% over the same month last year. The seasonally adjusted rate of production climbed to 78 million tpy, rising 1.9% over last year's figure. The paper sector accounted for the majority of the increase, with production up 3.2% from 1989. Paperboard production rose 0.7%.

Among major grades, newsprint showed an increase of 11.1%. Shipments of printing and writing paper were up 3.3% over the January-July period, with a 4.3% rise for coated grades. Containerboard production posted a 1.4% increase, largely due to a 1.0% increase in unbleached kraft linerboard, while boxboard production was down 1.0% through July. Paperboard production for export continued strong, up 12.0% for containerboard and 16.5% for boxboard.

Canadian newsprint shipments totaled 751,000 metric tons in July, dropping 3% over July 1989. Woodpulp shipments fell to 595,000 tons, a 4% decrease. Newsprint mills operated at 94% of capacity; woodpulp mills operated at 86% compared with 95% in July 1989. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	July	580	11.1	6,499	8.7
Uncoated groundwood (s)	July	157	6.1	1,751	2.0
Coated paper (s)	July	633	10.7	7,313	4.3
Uncoated free-sheet (s)	July	964	13.1	11,498	3.8
Other printing/writing	July	114	-8.1	1,546	1.2
Total packaging and other paper (s)	July	386	-1.3	4,669	-3.7
Tissue	July	480	4.8	5,733	2.7
Total paper	**July**	**3,293**	**7.4**	**39,009**	**3.2**
Unbleached kraft paperboard	July	1,735	2.8	19,998	2.0
Semichemical medium	July	493	2.9	5,708	0.2
Bleached paperboard	July	380	-7.3	4,474	-1.4
Recycled paperboard	July	696	2.1	8,742	-1.0
Total paperboard	**July**	**3,284**	**0.8**	**38,921**	**0.7**
Total U.S. paper and paperboard output	**July**	**6,578**	**4.0**	**77,930**	**1.9**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	June	5,173	1.4	62,643	1.2
Market pulp production	June	783	6.0	8,653	-2.0
Wastepaper consumption at paper/board mills	June	1,798	13.0	21,050	6.1
Pulpwood consumption (cords)	June	8,042	-3.7	95,834	1.1
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	July	26.444	7.3	185.169[6]	1.4
Containerboard inventories at U.S. box plants and mills	July 1	2,503	1.1		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	June	1,109	5.9	13,274	2.9
Imports of Canadian newsprint	June	897	40.8	8,481[6]	2.6
U.S. paper exports (including products)	June	574	14.1	8,828	8.3
Exports of unbleached kraft linerboard	June	248	69.9	2,682	15.5
Exports of woodpulp	June	560	-0.4	5,898	-7.2
Norscan pulp inventories[4]	July 31	1,682	80.9		
Norscan pulp operating rates[4]	July	91%	86%	87%	89%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	July	751	-3.1	5,489[6]	0.2
Operating rates	July	94%	96%	95%	96%
Inventories held by U.S. consumers	July 31	1,341	2.1		
Other paper/board shipments	July	610	13.0	4,302	8.3
Woodpulp shipments (export only)	July	595	-3.7	4,402	-9.1
Operating rates	July	86%	95%	87%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Market pulp: Canadian and U.S. producers try different strategies to survive market slump

Grade structure: Chemical paper-grade market pulp is sold in the open market and does not include captive pulp used onsite or shipped to affiliated mills within North America. Pulp is divided into grades based on whether it is made from softwood or hardwood fiber, produced by the sulfate (kraft) or sulfite pulping process, and bleached, semibleached, or unbleached.

Northern bleached softwood kraft (NBSK) is the premium pulp grade because of its long fiber length and strength. U.S. chemical paper pulp statistics include about 1.9 million tons of fluff pulp production (including exports) used in diapers and other absorbent hygiene products. Dissolving and mechanical pulp grades are excluded from the statistics.

Production/capacity: The pulp market has been in a downward slide all year caused by customer inventory reduction. This has led to lower shipments, rising producer inventories, and falling pulp prices. Latest industry statistics show that producer inventories of chemical paper-grade market pulp hit 1.68 million metric tons at the end of July—their highest level since early 1985. Most of the decline in prices has been in hardwood and southern pine, but even the list price of benchmark NBSK was lowered in July to $800/metric ton (down from $830 in the U.S. and $840 in Europe).

The strategies of Canadian and U.S. producers have been markedly different in coping with this declining market. Canadian producers tried to hold price levels stable by taking substantial mill downtime. This is reflected in Canadian shipments figures, which were down more than 14% during first-half 1990 from a year ago, while mills operated at 86% of capacity. The logic of the Canadian position is that the supply of premium long-fiber NBSK is relatively limited, most substitution by shorter fiber pulp has already taken place, and that it is pointless to battle lower-cost southern competitors on price.

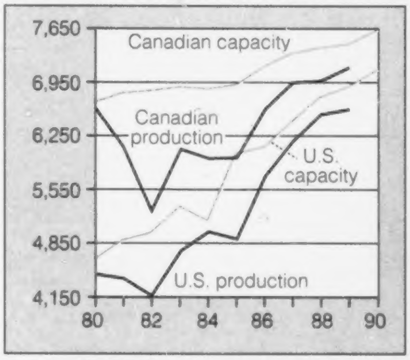
U.S. producers, on the other hand, responded to the weak market by dropping prices rapidly during the January through April period. This created an unusually large price gap with northern pulp, which increased demand for southern fiber. Shipments of U.S. mills were down only 2.8% during the first half, while they ran at 95% of capacity. Nevertheless, the impact of the higher volume on profitability was probably more than offset by the sharp price drop.

Future outlook: The pulp market is expected to remain under pressure in 1991 due to slower economic growth in the U.S. and Europe, which would affect printing/writing paper demand. In addition, market pulp capacity growth is expected to pick up next year with the completion of a number of major projects in North America and Latin America.

Examples include Weyerhaeuser Co.'s new Columbus, Miss., pulp line, which started up this summer (425,000 tpy softwood) and Daishowa Canada Co. Ltd.'s new mill scheduled for completion this fall in Peace River, Alta. (340,000 tpy hardwood). Two major eucalyptus projects scheduled for completion early next year are the Aracruz expansion in Brazil (525,000 tpy) and the new Santa Fe mill in Chile (250,000 tpy). In addition, there will be competition from three new chemi-thermomechanical pulp mills starting up in Canada and more wastepaper deinking projects.

Canadian chemical paper pulp production is projected to drop nearly 8% for all of 1990, with mills operating around 86% of capacity. However, production is expected to rebound about 5% in 1991 as customers begin to order more normally after reducing inventories and Canadian producers price their pulp more competitively. However, operating rates are projected to improve only to about 87% due to about a 3% increase in capacity. U.S. industry production is expected to increase by about 4% next year and mills are expected to continue running close to 94%. The weak U.S. dollar is expected to boost export demand helping offset slower growth in U.S. consumption.

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	**1989**	**1990e**	**1991e**
Production	6,571	6,680	6,975
Capacity[1]	6,890	7,100	7,462
Utilization rate	95.4%	94.0%	93.5%
Imports	2,785	2,752	2,880
Exports	4,072	4,016	4,300
Apparent U.S. consumption	5,284	5,416	5,555
Canada			
Production	7,089	6,550	6,900
Capacity[1]	7,429	7,592	7,910
Utilization rate	95.4%	86.3%	87.2%

e = *Pulp & Paper* 1990 estimate.

1. Based on 1989 American Paper Institute and Canadian Pulp & Paper Assn. capacity surveys.

TOP U.S. PRODUCERS *(000 tpy)*

	Annual capacity (000 short tpy)	**Market share (%)**
1. Georgia-Pacific[1,2,5,6]	1,675	11.4
2. Weyerhaeuser[1,2,3,5,6]	1,560	10.6
3. International Paper[1,2,6]	850	5.8
4. Canadian Pacific[1,2,3,4]	800	5.5
5. Fletcher Challenge[1,3,4]	705[a]	4.8
6. ~~Champion~~ International[1,2,3]	695[b]	4.7
7. Parsons & Whittemore[1,2]	660	4.5
8. Noranda[1,2,3,5]	568[c]	3.9
9. Canfor[1,3,4]	555[d]	3.8
10. MacMillan Bloedel[1,3,4]	500	3.4

Market share of top five companies:
39%
Market share of top ten companies:
58.8%
North American capacity (1990):
14.692 million metric tons
U.S.: 1.762; Canada: 2.027[1]

1. Bleached softwood kraft. 2. Bleached hardwood kraft. 3. Semibleached softwood kraft. 4. Unbleached kraft. 5. Bleached sulfite. 6. Fluff pulp.

a. Includes 45% of Donohue St Felicien.

b. Includes 50% of Caribou Pulp & Paper.

c. Includes 100% of Fraser and James Maclaren and 50% Northwood Pulp (but 48%-owned MacMillan Bloedel shown separately).

d. Includes 50% of Howe Sound Pulp & Paper.